ORDER NO. KMF0008215S3

Service Manual

Compact Plain Paper FAX/Multi-Function Plain Paper FAX

KX-FP101AL / KX-FP101NZ / KX-FP101ML / KX-FP105BX / KX-FP105CX / KX-FP121NZ / KX-FP121AL / KX-FM131AL

Please file and use this supplement manual together with the original and simplified service manuals for the following models.

Panasonic

Note:Supplement-1 have already supplied with printed matter. So please refer to that.

1. CHANGES

1.1. REPLACEMENT PARTS LIST

Reason for Change (Symbol:A) Following 1-8 reasons are indicated on the Notes in the bottom column.	
1. Improve performance 2. Change of material or dimension 3. To meet approved specification 4. Standardization 5. Addition 6. Deletion 7. Correction 8. Other	Note : a. The use with some models. b. The measure to remove the scratch from the back of the document. (Change in case that the user claims.)

Interchangeability code (Symbol:B) Following V-Z interchangeabilities are indicated on the Notes in the bottom column.

Parts	Set Production	Description
V	Original → Late (after change) New → Early (before change)	Original or new parts may be used in early or late production sets. Use original parts until exhausted, then stock new parts.
W	Original → Early (before change) New → Late (after change)	Original parts may be used in early production sets only. New parts may be used in early or late production sets. Use original parts where possible, then stock new parts.
X	Original → Late (after change) New → Early (before change)	New parts only may be used in early or late production sets. Stock new parts.
Y	Original → Early (before change) New → Late (after change)	Original parts may be used in early production sets only. New parts may be used in late production sets only. Stock both original and new parts.
Z	Other	

for KX-FP101AL/KX-FP101NZ

Ref. No.	Part No.		Part Name & Description	Pcs	Remarks	Notes		Ti ch (S
	Original Part	New Part						
20.1. CABINET AND ELECTRICAL PARTS								
34	PFUV1022Z	PFUV1022Y	COVER, OPERATION PANEL	1		7		
48	PFMH1063Z	PFZUFP101M	RIBBON GUIDE ASS´Y (See OPERATION PANEL SECTION.)	1	a	4	W	
48-1a	--------	PFHX1297Z	SHEET, RIBBON GUIDE (This part is changed to PFHX1115Z. See the next item.) [See OPERATION PANEL SETION .]	1		5		
48-1b	PFHX1297Z	PFHX1115Z	SHEET, RIBBON GUIDE (See OPERATION PANEL SECTION.)	1	a	4	W	
201	PFDX1011Z	PFDX1011Y	GEAR, TORQUE LIMITTER	1	a	8	W	
211	PFUA1019V	PFUA1019U	MAIN GEAR CHASSIS	1	a	1	V	
214	PFDG1087Z	PFDG1087Y	GEAR, B	1	a	8	X	
20.2. DIGITAL BOARD PARTS								
IC504	PFVIGM6256F	PFVIM0525LF	IC	1	a	8	V	
20.7. FIXTURES AND TOOLS								
EC1	PQZZ2K6Z	PQZZ2K1Z	CONNECTOR, 2P	1		7		
EC6	PQZZ10K4Z	PFZZ10K1Z	CONNECTOR, 10P	1		7		
EC10	PFZZ10K1Z	PFZZ10K3Z	CONNECTOR, 10P	1		7		

for KX-FP101ML

Ref. No.	Part No.		Part Name & Description	Pcs	Remarks	Notes		Ti ch (S
	Original Part	New Part						
21.1. CABINET AND ELECTRICAL PARTS								
32	PFDF1040Z	PFDF1040Y	SHAFT, LOCK LEVER	1	a	8	V	
34	PFUV1022Z	PFUV1022Y	COVER, OPERATION PANEL	1		7		
47	PFDR1011Z	PFDR1013Z	ROLLER, SUPPORT	1	b	1	W	
48	PFMH1063Z	PFZUFP101M	RIBBON GUIDE ASS´Y (See OPERATION PANEL SECTION.)	1	a	4	W	
48-1a	--------	PFHX1297Z	SHEET, RIBBON GUIDE (This part is changed to PFHX1115Z. See the next item.) [See OPERATION PANEL SETION.]	1		5		
48-1b	PFHX1297Z	PFHX1115Z	SHEET, RIBBON GUIDE (See OPERATION PANEL SECTION.)	1	a	4	W	
188	--------	PFNW1006Z	WASHER	1		5	X	
201	PFDX1011Z	PFDX1011Y	GEAR, TORQUE LIMITTER	1	a	8	W	
211	PFUA1019V	PFUA1019U	MAIN GEAR CHASSIS	1	a	1	V	
214	PFDG1087Z	PFDG1087Y	GEAR, B	1	a	8	X	
P1	PFPK1553Z-M	PFPK1553Y-M	GIFT BOX	1		8	X	
21.2. DIGITAL BOARD PARTS								
IC504	PFVIGM6256FF	PFVIM0525LFF	IC	1	a	8	V	
21.7. FIXTURES AND TOOLS								
EC1	PQZZ2K6Z	PQZZ2K1Z	CONNECTOR, 2P	1		7		
EC6	PQZZ10K4Z	PFZZ10K1Z	CONNECTOR, 10P	1		7		
EC9	PFZZ10K1Z	PFZZ10K3Z	CONNECTOR, 10P	1		7		

for KX-FP105BX/KX-FP105CX

Ref. No.	Part No.		Part Name & Description	Pcs	Remarks	Notes		Ti cl (S
	Original Part	New Part						
21.1. CABINET AND ELECTRICAL PARTS								
34	PFUV1022Z	PFUV1022Y	COVER, OPERATION PANEL	1		7		
48	PFMH1063Z	PFZUFP101M	RIBBON GUIDE ASS´Y (See OPERATION PANEL SECTION.)	1	a	4	W	
48-1a	--------	PFHX1297Z	SHEET, RIBBON GUIDE (This part is changed to PFHX1115Z. See the next item.) [See OPERATION PANEL SETION.]	1		5		
48-1b	PFHX1297Z	PFHX1115Z	SHEET, RIBBON GUIDE (See OPERATION PANEL SECTION.)	1	a	4	W	
188	--------	PFNW1006Z	WASHER	1		5	X	
201	PFDX1011Z	PFDX1011Y	GEAR, TORQUE LIMITTER	1	a	8	W	
211	PFUA1019V	PFUA1019U	MAIN GEAR CHASSIS	1	a	1	V	
214	PFDG1087Z	PFDG1087Y	GEAR, B	1	a	8	X	
21.2. DIGITAL BOARD PARTS								
IC504	PFVIGM6256RF	PFVIM0525LPF	IC	1	a	8	V	
21.4. OPERATION BOARD PARTS								
PCB3	PFLP1169MZ	PFLP1169MZ -A	OPERATION BOARD ASS'Y (RTL)	1		7		
21.7. FIXTURES AND TOOLS								
EC1	PQZZ2K6Z	PQZZ2K1Z	CONNECTOR, 2P	1		7		
EC6	PQZZ10K4Z	PFZZ10K1Z	CONNECTOR, 10P	1		7		
EC9	PFZZ10K1Z	PFZZ10K3Z	CONNECTOR, 10P	1		7		

for KX-FP121AL/KX-FP121NZ/KX-FM131AL

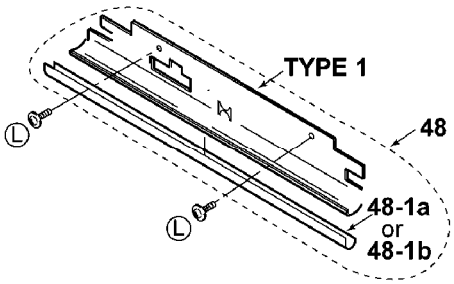
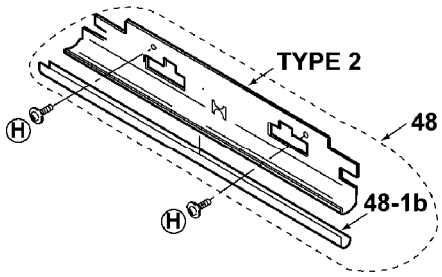
Ref. No.	Part No.		Part Name & Description	Pcs	Remarks	Notes		Ti ch (S
	Original Part	New Part						
14.1. CABINET AND ELECTRICAL PARTS								
211	PFUA1019V	PFUA1019U	MAIN GEAR CHASSIS	1	a	1	V	
214	PFDG1087Z	PFDG1087Y	GEAR, B	1	a	8	X	
14.7. FIXTURES AND TOOLS								
EC6	PQZZ10K1Z	PFZZ10K1Z	CONNECTOR, 10P	1		7		
EC9	PQZZ10K3Z	PFZZ10K3Z	CONNECTOR, 10P	1		7		

2. CABINET, MECHANICAL AND ELECTRICAL PARTS LOCATION

(OPERATION PANEL SECTION)

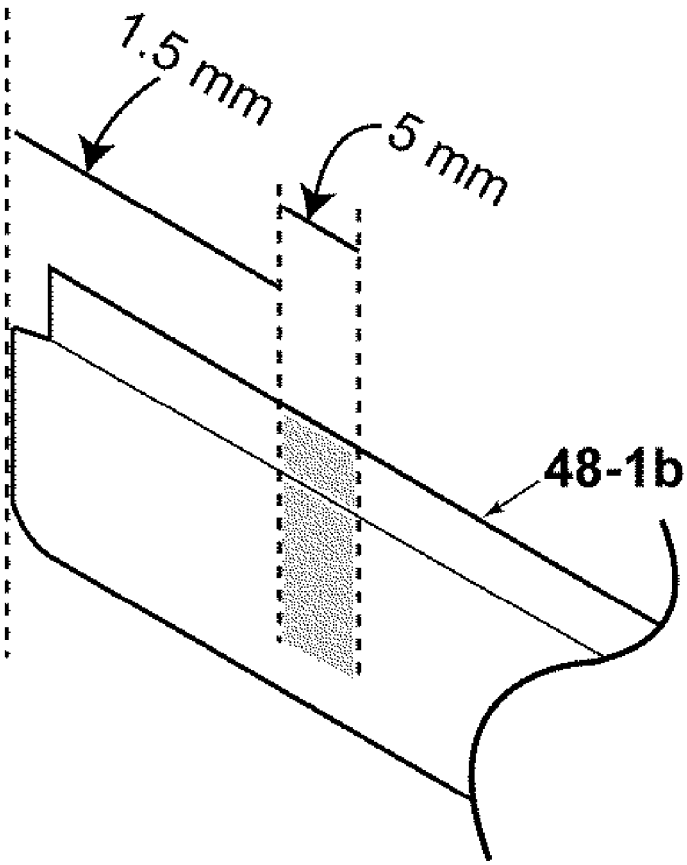
Please add the following change.

This change applies to all models listed on the cover page.

RIBBON GUIDE ASS'Y TYPE 1	RIBBON GUIDE ASS'Y TYPE 2
	

There are two types of Ribbon Guides (TYPE 1 and TYPE 2). If you have the TYPE 1, both types of Ribbon Guide Sheets (48-1a and 48-1b) can be used. However, when you use the 48-1b (PFHX1115Z) sheet, you should cut the sheet as illustrated in Fig. A. Therefore, in this case, the 48 -1a sheet is recommended to use.

Fig. A



Make a cut in the Ribbon Guide Sheet with a knife as illustrated above.

Check compatibility in the following table.

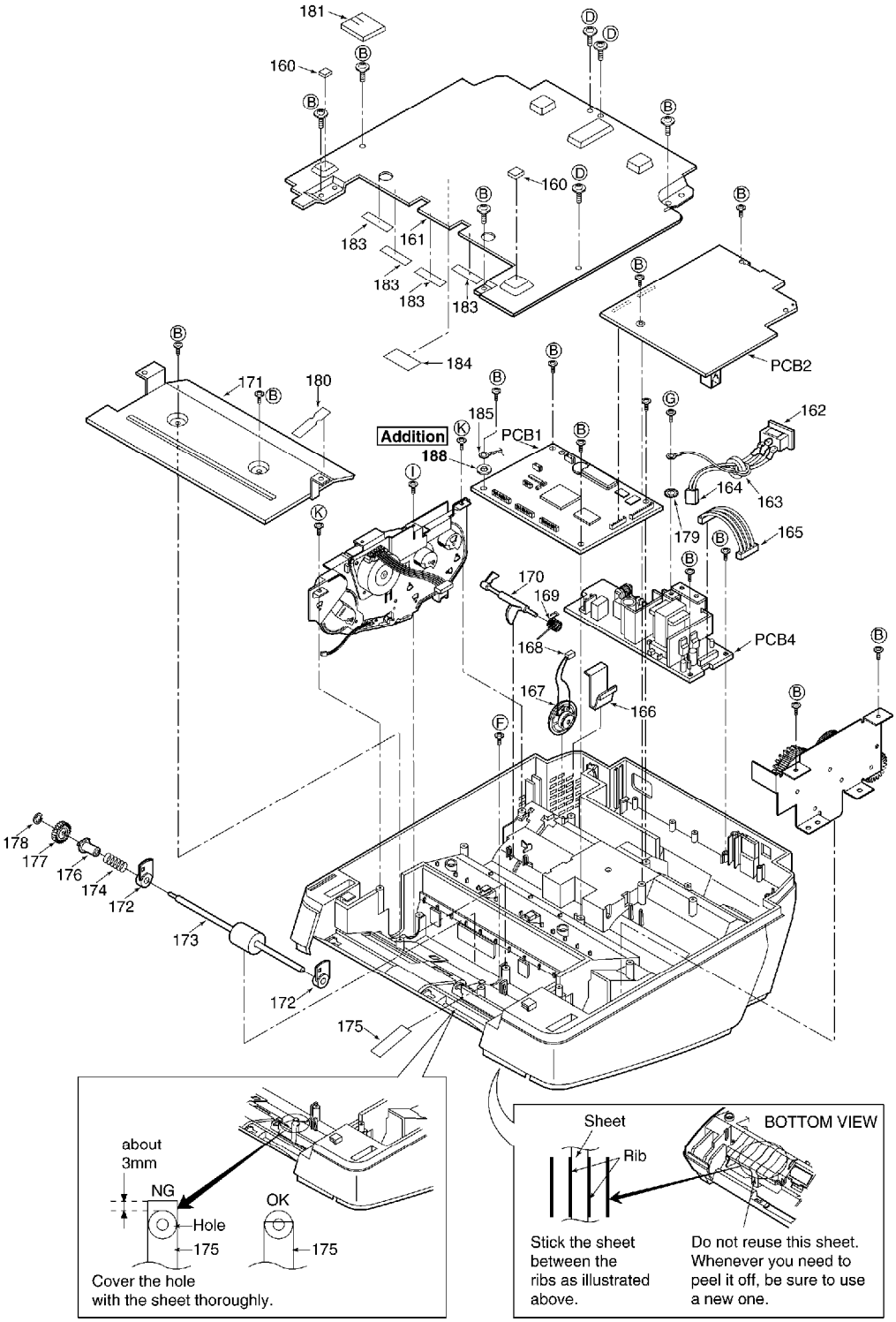
(Model KX-FP101AL/NZ/ML/KX-FP105BX/KX-FP105CX)

Ribbon Guide Type / *Compatibility*	**TYPE 1**	**TYPE 2**
48-1a: PFHX1297Z	○	×
48-1b: PFHX1115Z	△	○
Ⓛ XTW3+U8L	○	×
Ⓗ XTW3+U6L	×	○

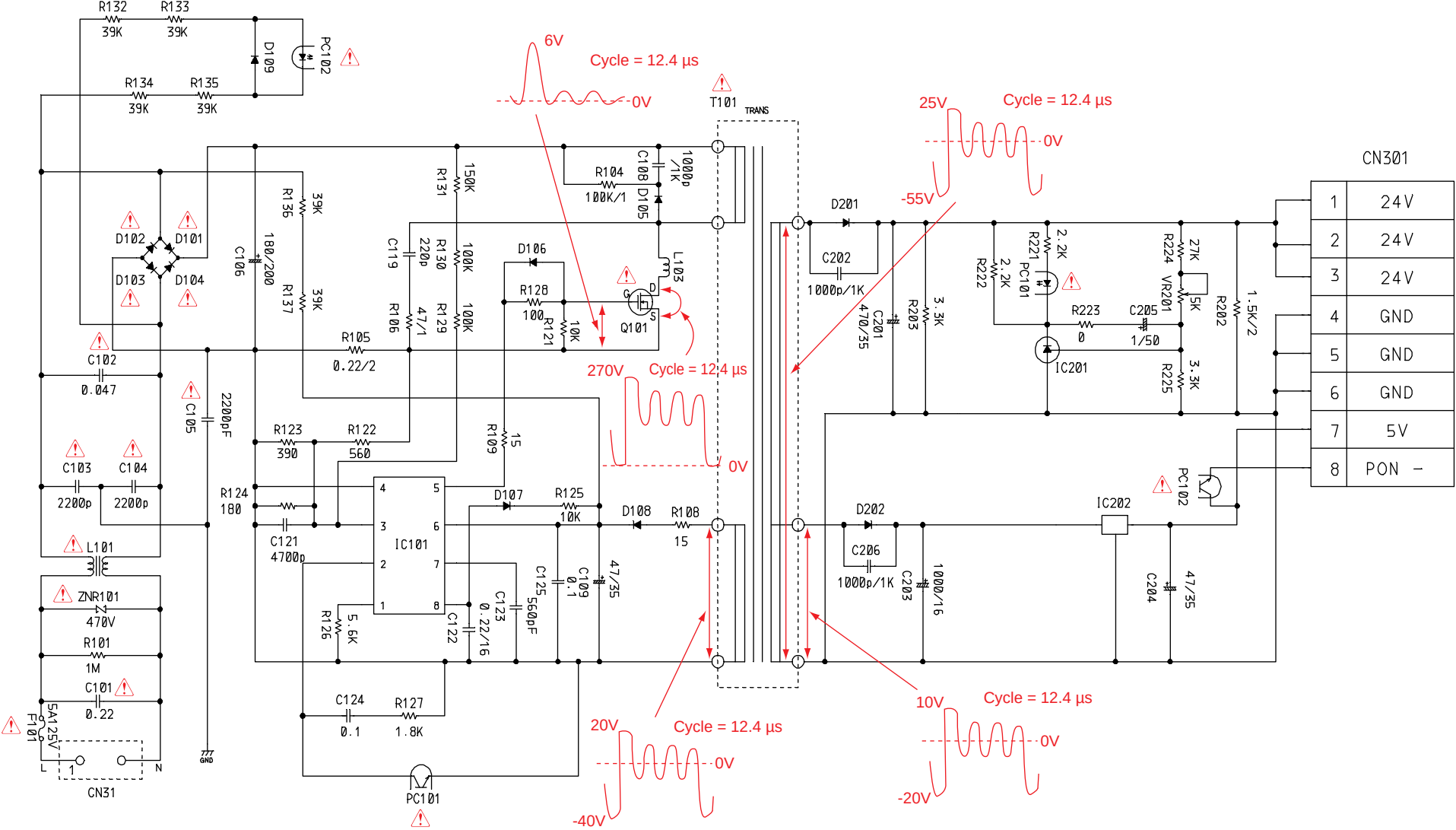
○ = Yes
× = No
△ = Yes, but not recommended.

Change from original page 198 (LOWER/P.C.B. SECTION)

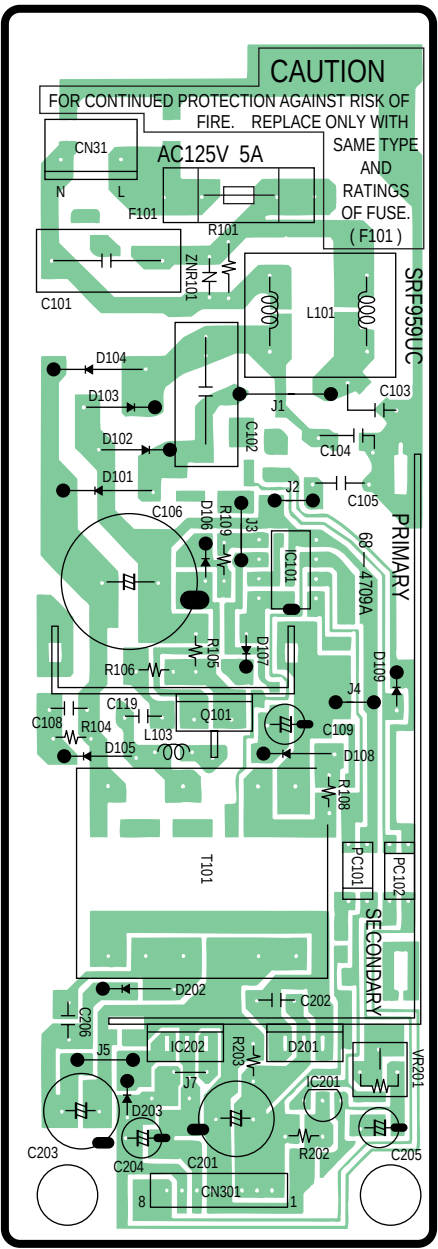
(Model KX-FP101ML/KX-FP105BX/KX-FP105CX)



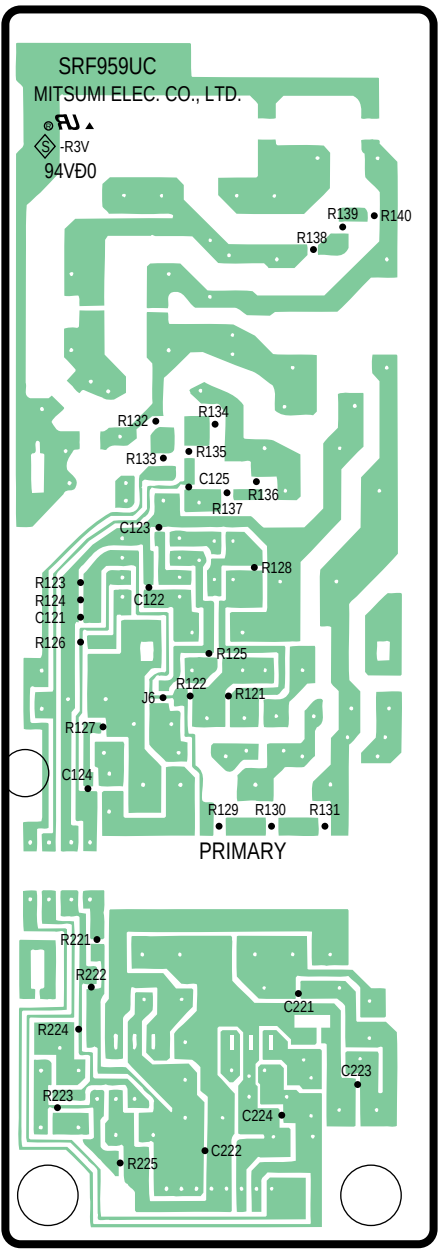
I.(Q) / KXFP101Series/KXFP121NZ/AL / KXFM131AL / Printed in Japan


R132 39K
R133 39K
R134 39K
R135 39K
D109
PC102
6V
Cycle = 12.4 µs
0V
T101
TRANS
25V
Cycle = 12.4 µs
0V
-55V
CN301
1 24V
2 24V
3 24V
4 GND
5 GND
6 GND
7 5V
8 PON -
D102
D101
D103
D104
C106 180/200
R136 39K
R137 39K
R131 150K
C119 220p
R130 100K
R106 47/1
R129 100K
R104 100K/1
C108 1000p /1K
D105
D106
R128 100
R121 10K
L103
Q101
C102 0.047
R105 0.22/2
270V
Cycle = 12.4 µs
0V
C105 2200pF
C103 2200p
C104 2200p
R123 390
R122 560
R109 15
R124 180
C121 4700p
IC101
D107
R125 10K
D108
R108 15
L101
ZNR101 470V
R101 1M
C101 0.22
F101 5A 125V
CN31
GND
R126 5.6K
C122
C123 0.22/16
C125 560pF
C109 0.1
47/35
C124 0.1
R127 1.8K
PC101
20V
Cycle = 12.4 µs
0V
-40V
D201
C202 1000p/1K
C201 470/35
R203 3.3K
R222 2.2K
PC101
R221 2.2K
R223 0
C205 1/50
IC201
R224 27K
VR201 5K
R225 3.3K
R202 1.5K/2
D202
C206 1000p/1K
C203 1000/16
IC202
PC102
C204 47/35
10V
Cycle = 12.4 µs
0V
-20V

(Component View)



(Bottom View)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MITSUMI ELEC. CO., LTD.
-R3V
94VÐ0
R139
R140
R138
R132
R134
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C125
R136
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C123
R128
R123
R124
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R122
J6
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C221
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R225

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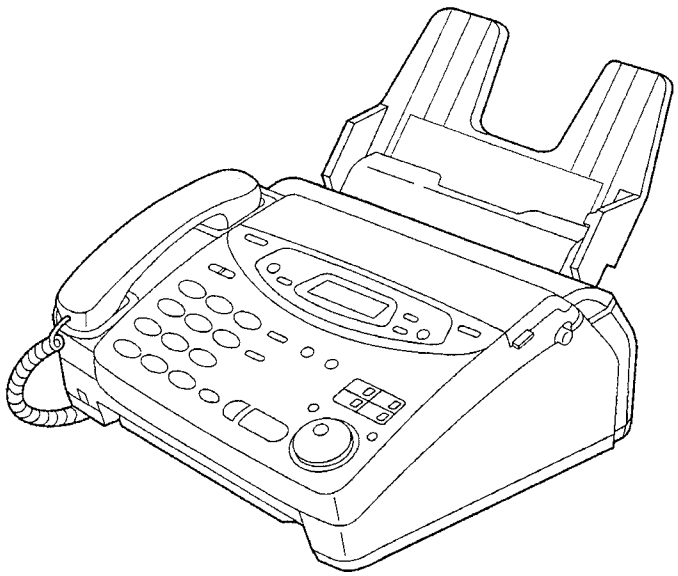

KX-FP121

(for U.S.A.)

⚠ WARNING

This service information is designed for experienced repair technicians only and is not designed for use by the general public.
It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product.
Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.

When you note the serial number, write down all 11 digits. The serial number may be found on the bottom of the unit.

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KX-FP121

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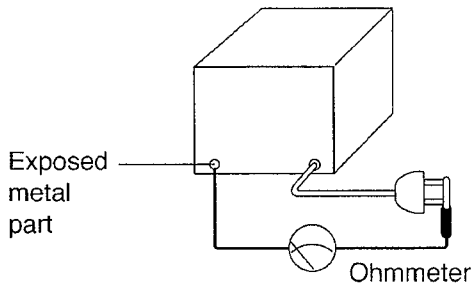
1 INTRODUCTION

1.1. SAFETY PRECAUTIONS

1. Before servicing, unplug the AC power cord to prevent an electric shock.
2. When replacing parts, use only the manufacturer's recommended components.
3. Check the condition of the power cord. Replace if wear or damage is evident.
4. After servicing, be sure to restore the lead dress, insulation barriers, insulation papers, shields, etc.
5. Before returning the serviced equipment to the customer, be sure to perform the following insulation resistance test to prevent the customer from being exposed to shock hazards.

1.2. INSULATION RESISTANCE TEST

1. Unplug the power cord and short the two prongs of the plug with a jumper wire.
2. Turn on the power switch.
3. Measure the resistance value with an ohmmeter between the jumpered AC plug and each exposed metal cabinet part (screwheads, control shafts, bottom frame, etc.).
   Note: Some exposed parts may be isolated from the chassis by design. These will read infinity.
4. If the measurement is outside the specified limits, there is a possibility of a shock hazard.



Resistance = more than 1MΩ
(at DC 500 V)

1.3. FOR SERVICE TECHNICIANS

ICs and LSIs are vulnerable to static electricity.

When repairing, the following precautions will help prevent recurring malfunctions.

1. Cover the plastic part's boxes with aluminum foil.
2. Ground the soldering irons.
3. Use a conductive mat on the worktable.
4. Do not touch the IC or LSI pins with bare fingers.

1.4. BATTERY CAUTION

CAUTION

Danger of explosion if the battery is replaced incorrectly. Replace only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to following caution:

Disposal of lithium batteries should be performed by permitted, professional disposal firms knowledgeable in state government federal and local hazardous materials and hazardous waste transportation and disposal requirements.

A battery continues to have no transportation limitations as long as it is separated to prevent short circuits and packed in strong packaging.

Commercial firms that dispose of any quantity of lithium cells should have a mechanism in place to account for their ultimate disposition. This is a good practice for all types of commercial or industrial waste.

Recommend Type Number:

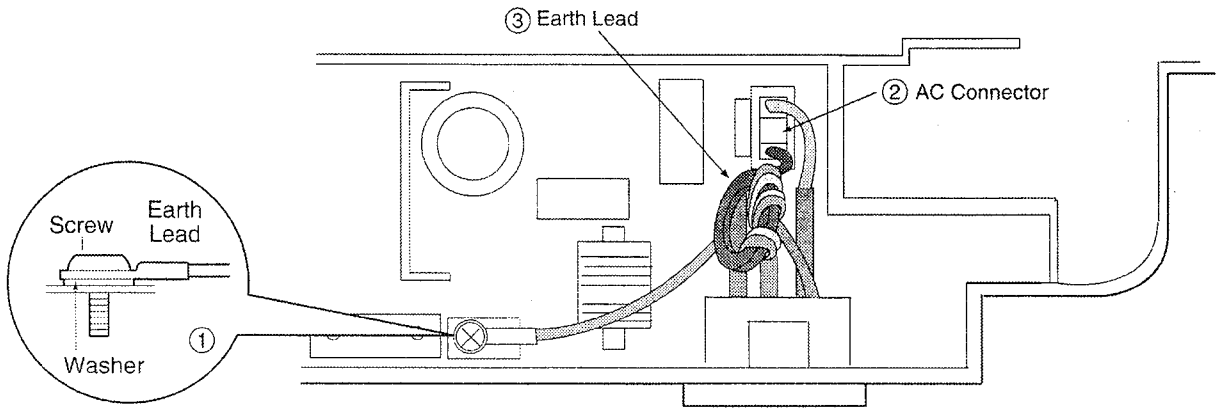
CR2032 (BATT) Manufactured by MATSUSHITA

CR2032 (BATT) Manufactured by SONY

1.5. AC CAUTION

For safety, before closing the lower cabinet, please make sure of the following precautions.

1. The earth lead is fixed with the screw.
2. The AC connector is connected properly.
3. Wrap the earth lead around the core 3 times.



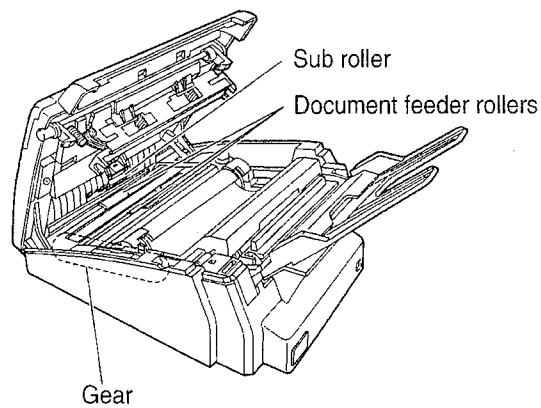
(BOTTOM VIEW)

1.6. PERSONAL SAFETY PRECAUTIONS

1.6.1. MOVING SECTIONS OF THE UNIT

Be careful not to let your hair, clothes, fingers, accessories, etc., become caught in any moving sections of the unit.

The moving sections of the unit are the rollers and a gear. There is a separation roller and a document feed roller which are rotated by the document feed motor. A gear rotates the two rollers. Be careful not to touch them with your hands, especially when the unit is operating.



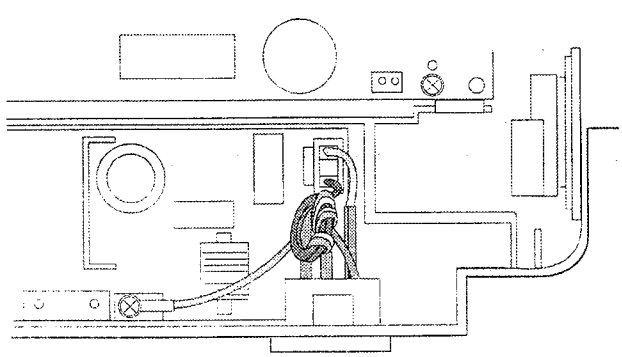
1.6.2. LIVE ELECTRICAL SECTIONS

All the electrical sections of the unit supplied with AC power by the AC power cord are live.

Never disassemble the unit for service with the AC power supply plugged in.

CAUTION:

AC voltage is supplied to the primary side of the power supply unit. Therefore, always unplug the AC power cord before disassembling for service.

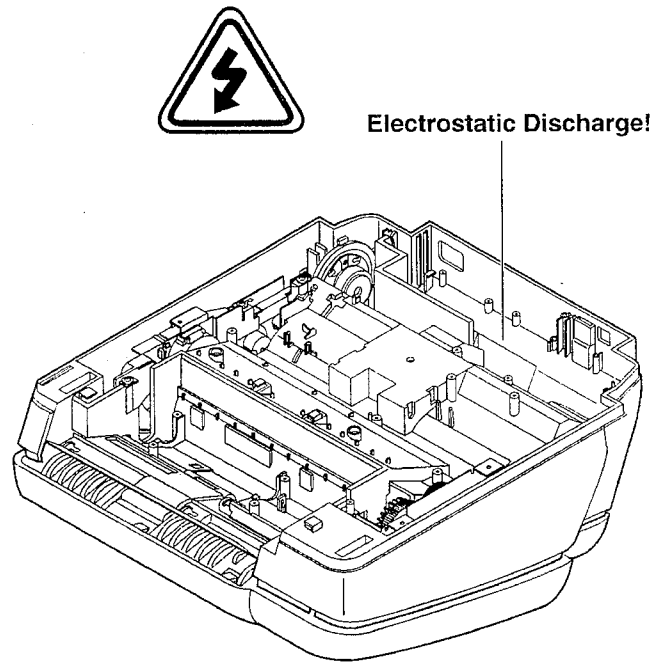


(Bottom View)

1.7. SERVICE PRECAUTIONS

1.7.1. PRECAUTIONS TO PREVENT DAMAGE FROM STATIC ELECTRICITY

Electrical charges accumulate on a person. For instance, clothes rubbing together can damage electric elements or change their electrical characteristics. In order to prevent static electricity, touch a metallic part that is grounded to release the static electricity. Never touch the electrical sections such as the power supply unit, etc.



1.8. FEATURES

General

- Help function

  Display:

  1. SEND GUIDE
  2. HOW TO SET UP
  3. JOG/AUTO DIAL
  4. TAD OPERATION
  5. FAX SENDING
  6. FAX RECEIVING
  7. COPIER
  8. Q and A
  9. ERRORS
  10. REPORTS
  11. CALLER ID

- LCD (Liquid Crystal Display) readout
- IQ-FAX™ (for U.S.A. only)

  This feature can only be used by those who apply to the FaxSav service.

  IQ-FAX is intelligent faxing which allows you to send faxes via the internet by using the IQ-FAX button.

  Behind the IQ-FAX button is the FaxSav Global Fax Network which manages the delivery of your fax to any fax machine in the world. It routes your fax via the best and most time efficient route and will automatically resend your fax for you, if the receiving fax machine is unavailable.

  This "fax-only" network has the added advantage of cost efficiency due to the internet being integrated into the net work. Every fax is secure since the FaxSav net work utilizes the highest encryption legally allowed, ensuring that your documents stay secure. You get the benefits of carefree faxing with savings associated with the use of the internet. It is simple, quick, and secure.

Digital Answering System

- Voice Time/Day Stamp
- 18-Minutes recording time
- Voice guidance for remote operation
- Voice and fax paper call

Plain Paper Facsimile Machine

- 9 second transmission speed *
- Letter/Legal, G3 compatible
- Automatic document feeder (15 sheets)
- 6 stations one-touch dialer
- Broadcast (up to 20 station) x 3
- Resolution : Standard/Fine/Super fine/Half tone (64 level)
- LCD Contrast : Normal/Darker
- Delayed transmission
- Overseas transmission function
- Remote FAX receiving using an extension phone
- 150-sheet paper capacity
- Automatic fax/phone switching
- Distinctive ring detection **
- High speed 14400 bps fax modem
- Out of paper reception (up to 28 papers) ***

* The 9 second speed is based upon the CCITT No. 1 Test Chart on the condition that memory transmission is performed.

** Subscription to distinctive ring services required.

*** 350KB memory. Actual number of Pages depends upon the contents of the Pages and the resolution. 28-page capacity based upon CCITT No. 1 Test Chart at standard resolution.

Large Memory (28 pages) Performed by DRAM

Approx. 28 pages of memory reception

Approx. 25 pages of memory transmission

Integrated Telephone System

- On-hook dialing
- Digital duplex speakerphone
- Voice muting
- Redialing function
- 100-Station telephone directory with Jog Dial
- One-Touch dial (3x2 Phone Numbers)

Copier function

- Multi-copy function (up to 99 copies)
- Enlargement and reduction
- Collate
- 64-Level halftone
- Electronic film indicator

1.9. SPECIFICATIONS

These specifications are for the U.S.A. version only. Refer to the simplified manual (cover) for other areas.

Applicable Lines:	Public Switched Telephone Network
Document Size:	Max. 216 mm (8 1/2") in width
	Max. 600 mm (23 5/8") in length
Effective Scanning Width:	208 mm (8 3/16")
Recording Paper Size:	Letter: 216x279 mm (8 1/2"x11")
	Legal: 216x356 mm (8 1/2"x14")
Effective Printing Width:	208 mm (8 3/16")
Transmission Time*:	Approx. 9 sec./page (Original mode)**
Scanning Density:	Horizontal:
	8 pels/mm (203 pels/inch)
	Vertical:
	3.85 lines/mm (98 lines/inch)—STANDARD mode
	7.7 lines/mm (196 lines/inch)—FINE/HALF TONE mode
	15.4 lines/mm (392 lines/inch)—SUPER FINE Mode
Halftone Level:	64-level
Scanner Type:	Contact Image Sensor
Printer Type:	Thermal Printing
Data Compression System:	Modified Huffman (MH), Modified READ (MR)
Modem Speed:	14,400/12,000/9,600/7,200/4,800/2,400 bps; Automatic Fallback
Operating Environment:	5—35°C (41—95°F), 20—80 % RH(Relative Humidity)
Dimensions (HxWxD):	154x365x355 mm (6 1/16"x14 3/8"x13 31/32")
Mass (Weight):	Approx. 4.85 kg (10.7 lb.)
Power Consumption:	Standby: Approx. 6.0 W
	Transmission: Approx. 18 W
	Reception: Approx. 37 W (When receiving a 20% black document)
	Copy: Approx. 48 W (When copying a 20% black document)
	Maximum: Approx. 160 W (When copying a 100% black document)
Power Supply:	120 V AC, 60 Hz (This unit will not function at 50 Hz.)
Memory Capacity:	Voice memory: Approx. 18 minutes of recording time including the greeting message***
	Fax memory:
	Approx. 28 pages memory reception
	Approx. 25 pages memory transmission
	(Based on CCITT No. 1 Test Chart in standard resolution.)

* Transmission speed depends upon the contents of the pages, resolution, telephone line conditions and capability of the receiving unit.

** The 9 second speed is based upon the CCITT No. 1 Test Chart on the condition that memory transmission is performed. (Refer to next page.)

*** Recording time may be reduced by the calling party's background noise.

Design and specifications are subject to change without notice.

1.10. OPTIONAL ACCESSORIES

Model No.	Description	Specifications
KX-FA65	Film cartridge	216 mm x 100 m (8½" x 328') roll
PFZXFP101M	Paper stacker	Used to stack printed paper.

1.11. CCITT No. 1 Test Chart (Actual size)

THE SLEREXE COMPANY LIMITED

SAPORS LANE - BOOLE - DORSET - BH 25 8 ER

TELEPHONE BOOLE (945 13) 51617 - TELEX 123456

Our Ref. 350/PJC/EAC 18th January, 1972.

Dr. P.N. Cundall,
Mining Surveys Ltd.,
Holroyd Road,
Reading,
Berks.

Dear Pete,

Permit me to introduce you to the facility of facsimile transmission.

In facsimile a photocell is caused to perform a raster scan over the subject copy. The variations of print density on the document cause the photocell to generate an analogous electrical video signal. This signal is used to modulate a carrier, which is transmitted to a remote destination over a radio or cable communications link.

At the remote terminal, demodulation reconstructs the video signal, which is used to modulate the density of print produced by a printing device. This device is scanning in a raster scan synchronised with that at the transmitting terminal. As a result, a facsimile copy of the subject document is produced.

Probably you have uses for this facility in your organisation.

Yours sincerely,

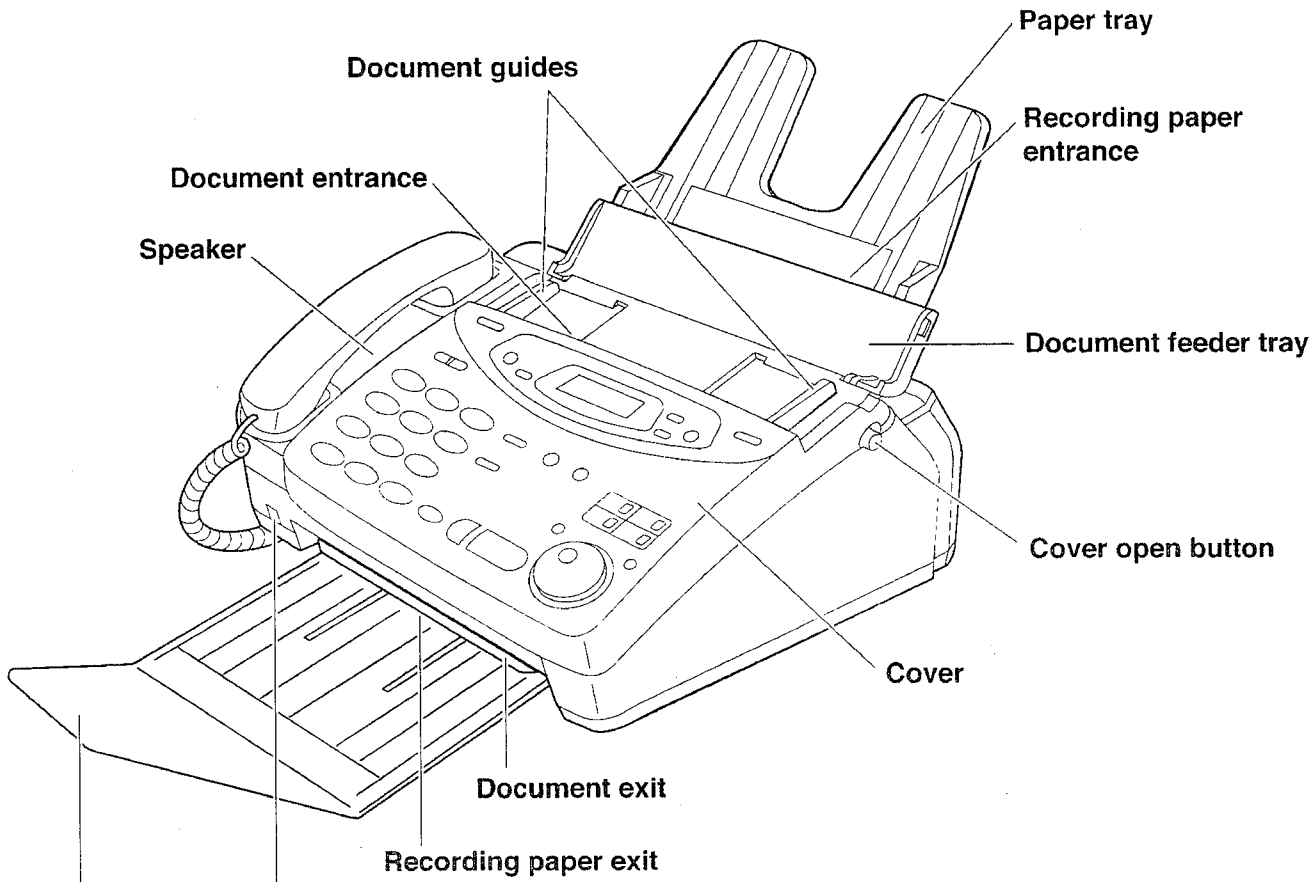
Phil.

P.J. CROSS
Group Leader - Facsimile Research

Registered in England: No. 2038
Registered Office: 60 Vicara Lane, Ilford. Essex.

1.12. LOCATION OF CONTROLS

1.12.1. OVERVIEW

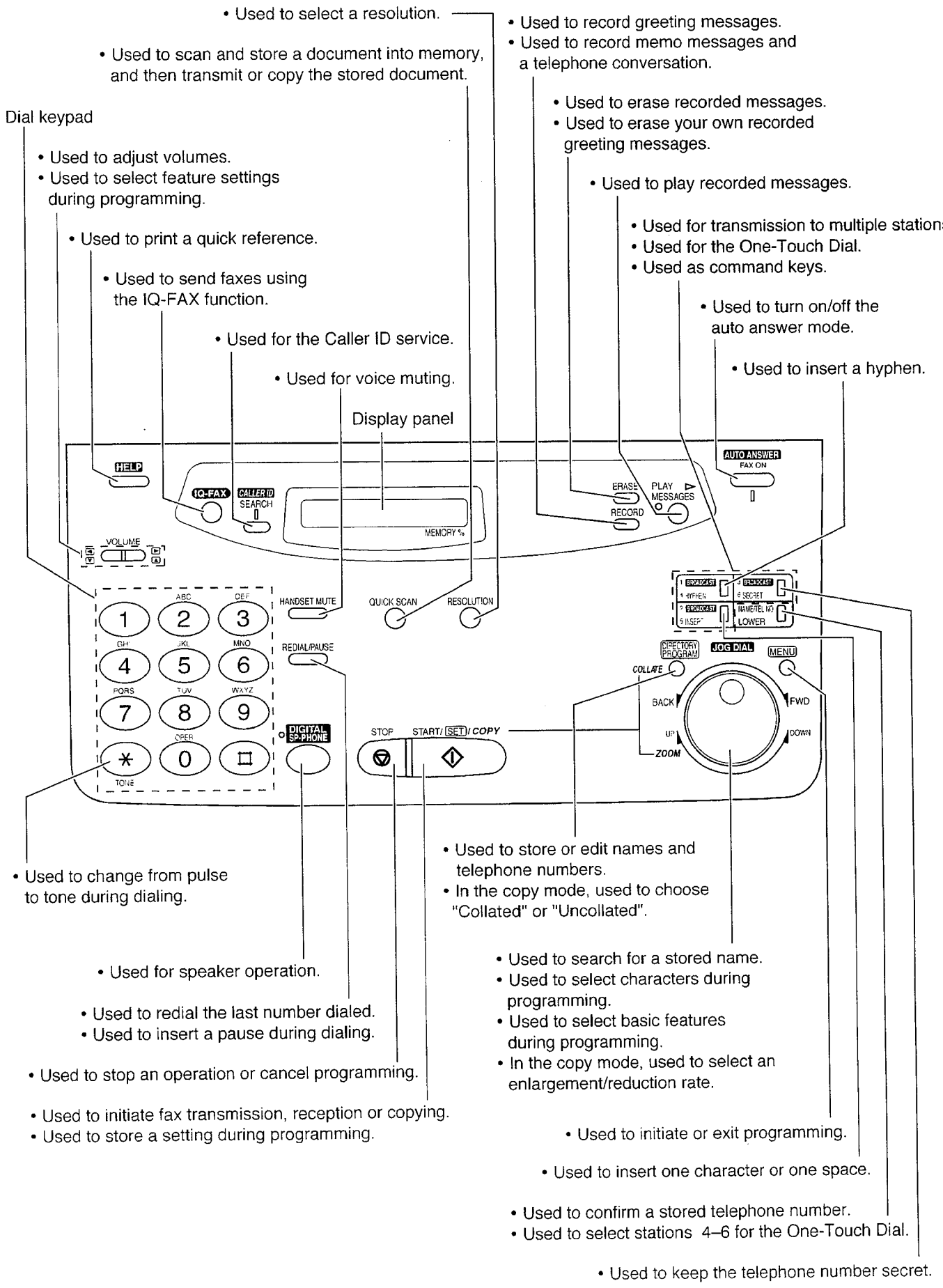


Microphone

- Used to talk with the other party when using the speakerphone.
- Used to record greeting messages and memo messages.

Paper stacker (Optional Accessories)

1.12.2. CONTROL PANEL


• Used to select a resolution.
• Used to scan and store a document into memory, and then transmit or copy the stored document.
Dial keypad
• Used to adjust volumes.
• Used to select feature settings during programming.
• Used to print a quick reference.
• Used to send faxes using the IQ-FAX function.
• Used for the Caller ID service.
• Used for voice muting.
Display panel
• Used to record greeting messages.
• Used to record memo messages and a telephone conversation.
• Used to erase recorded messages.
• Used to erase your own recorded greeting messages.
• Used to play recorded messages.
• Used for transmission to multiple stations.
• Used for the One-Touch Dial.
• Used as command keys.
• Used to turn on/off the auto answer mode.
• Used to insert a hyphen.
HELP
IQ-FAX
CALLER ID
SEARCH
MEMORY %
VOLUME
ERASE
PLAY MESSAGES
RECORD
AUTO ANSWER
FAX ON
HANDSET MUTE
QUICK SCAN
RESOLUTION
REDIAL/PAUSE
DIGITAL SP-PHONE
STOP
START/SET/COPY
DIRECTORY PROGRAM
JOG DIAL
MENU
COLLATE
BACK
FWD
UP
DOWN
ZOOM
LOWER
• Used to change from pulse to tone during dialing.
• Used to store or edit names and telephone numbers.
• In the copy mode, used to choose "Collated" or "Uncollated".
• Used for speaker operation.
• Used to redial the last number dialed.
• Used to insert a pause during dialing.
• Used to stop an operation or cancel programming.
• Used to initiate fax transmission, reception or copying.
• Used to store a setting during programming.
• Used to search for a stored name.
• Used to select characters during programming.
• Used to select basic features during programming.
• In the copy mode, used to select an enlargement/reduction rate.
• Used to initiate or exit programming.
• Used to insert one character or one space.
• Used to confirm a stored telephone number.
• Used to select stations 4–6 for the One-Touch Dial.
• Used to keep the telephone number secret.

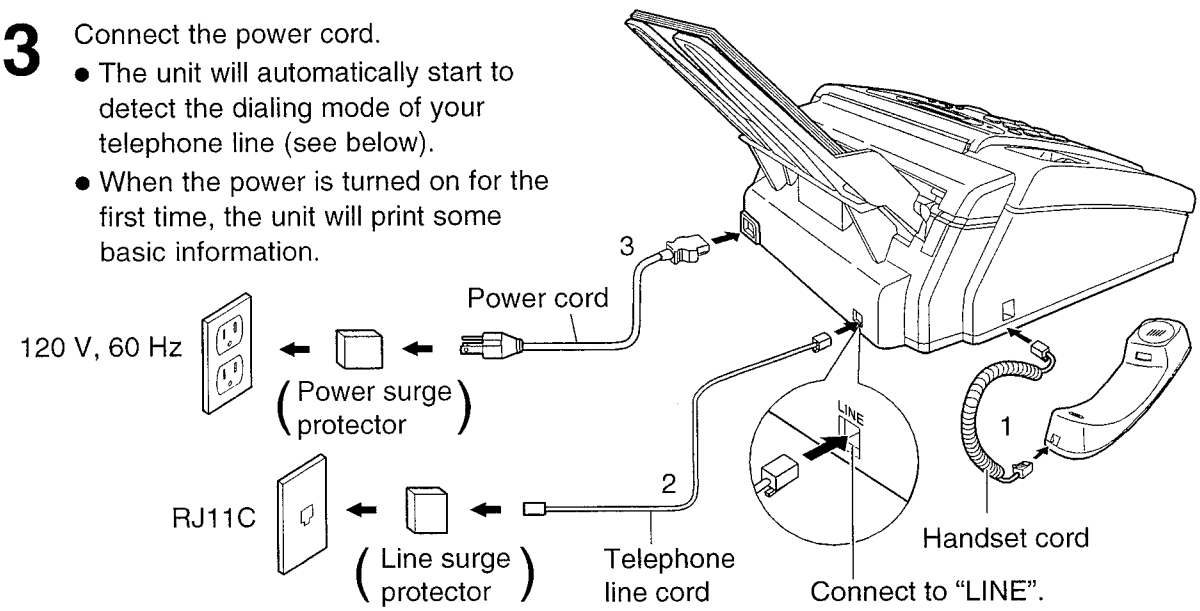
1.13. CONNECTIONS

This connection is for the U.S.A. version only. Refer to the simplified manual (cover) for other areas.

1 Connect the handset cord.

2 Connect the telephone line cord.

3 Connect the power cord.
- The unit will automatically start to detect the dialing mode of your telephone line (see below).
- When the power is turned on for the first time, the unit will print some basic information.



Note:
- For additional equipment protection, we recommend the use of a surge protector. The following types are available; TELESPIKE BLOK MODEL TSB (TRIPPE MFG. CO.), SPIKE BLOK MODEL SK6-0 (TRIPPE MFG. CO.), SUPER MAX (PANAMAX) or MP1 (ITW LINX).
  The warranty does not cover damage due to power line surges or lightning.
- When you operate this product, the power outlet should be near the product and easily accessible.
- If you want to connect an answering machine to the unit.

Automatic dialing mode setting

- When the telephone line cord and the power cord are connected, the unit will automatically start to detect the dialing mode of your telephone line.

  Display: `CHECKING LINE`

  Wait until one of the following messages is displayed.

  `LINE IS TONE` Your line has touch tone service.

  `LINE IS PULSE` Your line has rotary pulse dial service.

- If the power cord is disconnected or a power failure occurs, the unit will detect the dialing mode again when power is restored.
- If you connect the power cord before connecting the telephone line cord, the following messages will be shown alternately.

  `INSERT TEL LINE` ⟷ `NO TEL LINE`

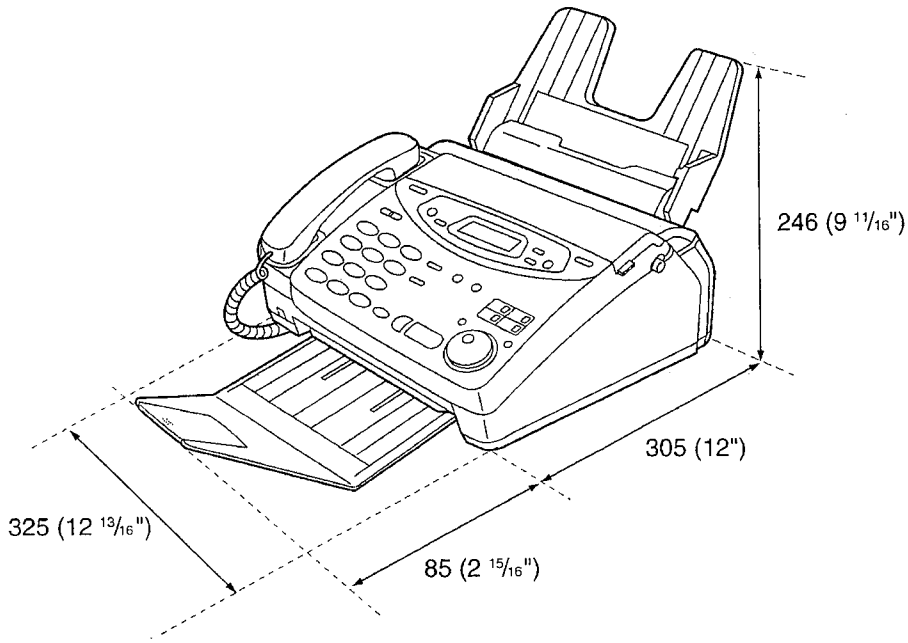
  Connect the telephone line cord.

1.14. INSTALLATION

1.14.1. INSTALLATION SPACE

The space required to install the unit is shown below.

The dimensions given are necessary for the unit to operate efficiently.



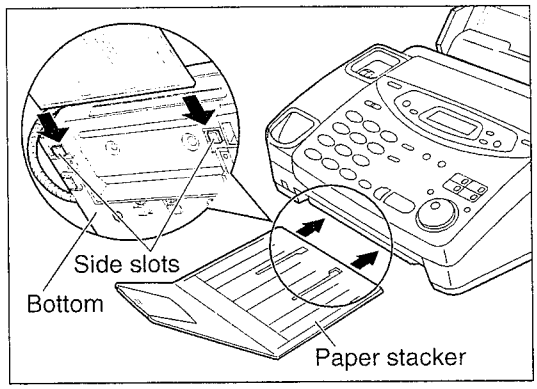
Note:

- Avoid excessive heat or humidity.
- Use the unit within the following ranges of temperature and humidity.
- Ambient temperature: 5°C to 35°C
- Relative humidity: 20% to 80% (without condensation)
- Power cord length should be less than 5 meters (16.4 feet). Using a longer cord may reduce the voltage or cause malfunctions.
- Avoid direct sunlight.
- Do not install near devices which contain magnets or generate magnetic fields.
- Do not subject the unit to strong physical shock or vibration.
- Keep the unit clean. Dust accumulation can prevent the unit from functioning properly.
- To protect the unit from damage, hold both sides when you move it.

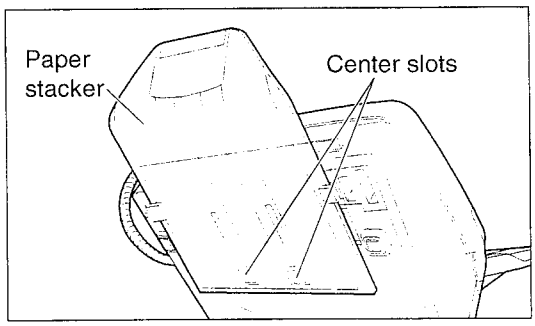
1.14.2. INSTALLING THE PAPER STACKER

1 Remove the shipping tape from the paper stacker.

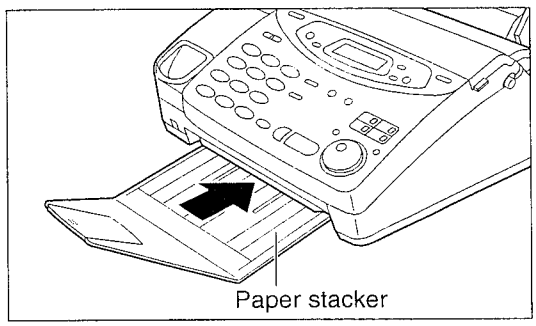
2 Lift the front of the unit and insert the paper stacker into the side slots.



3 Confirm if the paper stacker is locked into the center slots.

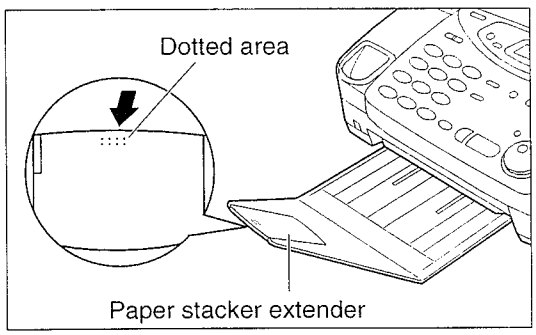


4 Slide the paper stacker until it stops.

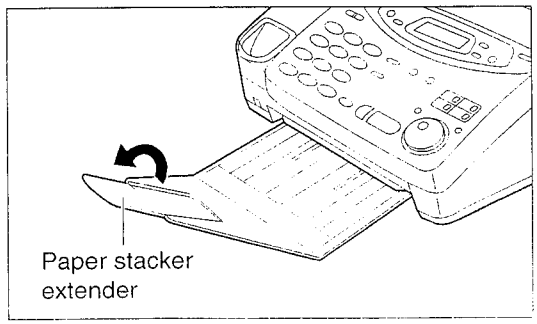


1.14.3. USING LEGAL SIZE PAPER

1 Press the dotted area on the paper stacker extender.

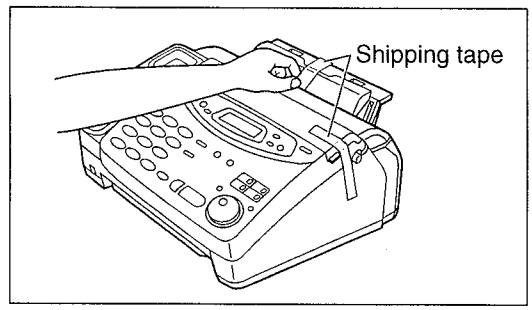


2 Open the paper stacker extender.



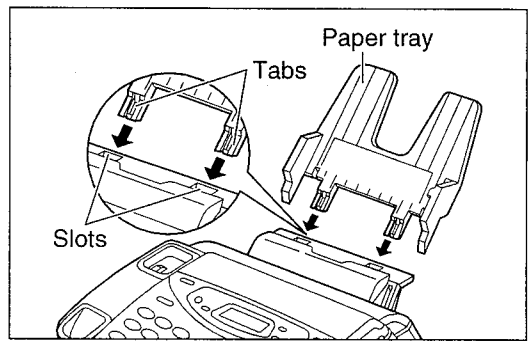
1.14.4. INSTALLING THE PAPER TRAY

1 Remove the shipping tape from the unit.



2 Insert the two tabs on the paper tray into the slots on the back of the unit.

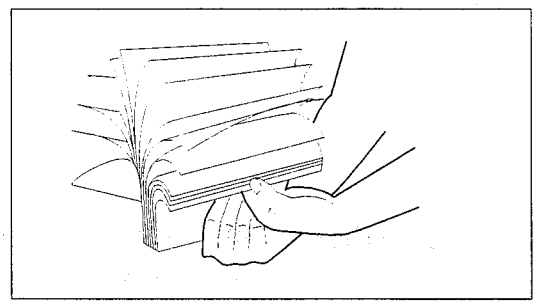
- Do not place the unit in areas where the paper tray may be obstructed by a wall, etc.



1.14.5. INSTALLING THE RECORDING PAPER

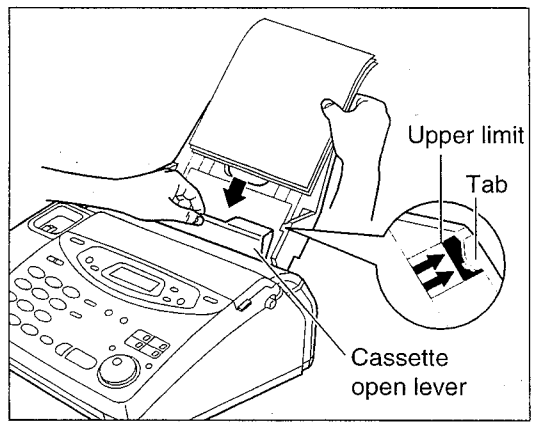
Letter or legal size recording paper can be loaded. The paper tray can hold up to 150 sheets of 75 g/m² (20 lb.) paper. You may use 60 g/m² to 90 g/m² (16 lb. to 24 lb.) paper.
For best results, only use inkjet paper like Hammermill Jet Print. If you use other types of paper, the print quality may be affected.

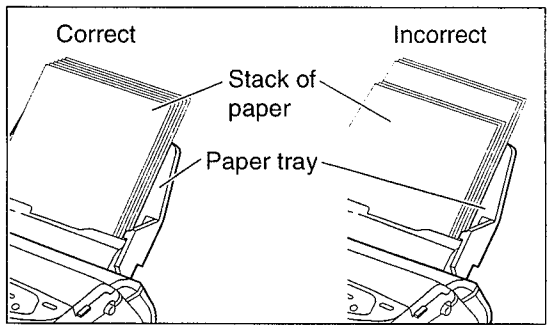
1 Fan the stack of paper to prevent a paper jam.



2 Pull the cassette open lever forward and insert the paper into the cassette completely.

- The height of the stack of the paper should not exceed the upper limit on the paper tray, otherwise the paper may jam or multi-feed.
- The paper should not be over the tab.
- If the paper is not inserted correctly, readjust the paper or the paper may jam.



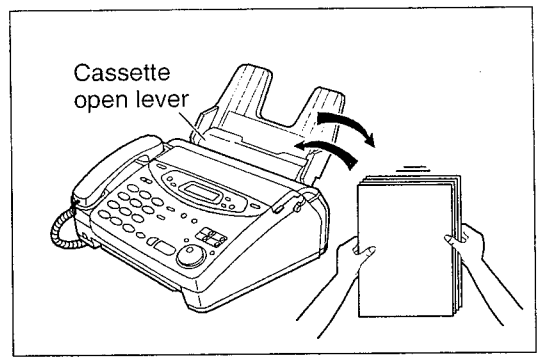


Note:

- **Avoid paper with a cotton and/or fiber content that is over 20%, such as letterhead paper or those used for resumes.**
- **Do not use different types or thicknesses of paper in the cassette at the same time. This may cause a paper jam.**
- **Avoid extremely smooth or shiny paper that is highly textured. Also avoid paper that is coated, damaged or wrinkled.**
- Avoid double-sided printing.
- Do not use paper printed from this unit for double-sided printing with other copiers or printers, or the papermay jam.

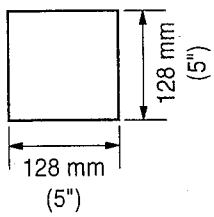
1.14.6. ADDING PAPER TO THE PAPER TRAY

1. Pull the cassette open lever forward and remove all of the installed paper.
2. Add paper to the removed paper and straighten it.
3. Fan the stack of paper.
4. Pull the cassette open lever forward and insert the paper into the cassette.

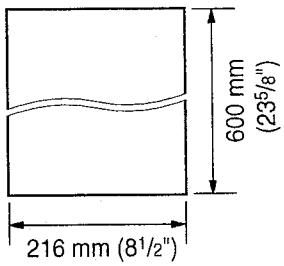


1.14.7. DOCUMENTS THE UNIT CAN FEED

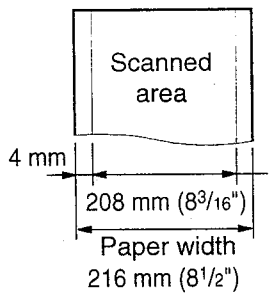
Minimum size



Maximum size



Effective scanning area



Document weight

Single sheet:
45 g/m² to 90 g/m²
(12 lb. to 24 lb.)

Multiple sheets:
60 g/m² to 75 g/m²
(16 lb. to 20 lb.)

Note:

- Remove clips, staples or other similar fastening objects.
- Check that ink, paste or correction fluid has dried.
- Do not send the following types of documents. Use copies for fax transmission.
  - — Chemically treated paper such as carbon or carbonless duplicating paper
  - — Electrostatically charged paper
  - — Heavily curled, creased or torn paper
  - — Paper with a coated surface
  - — Paper with a faint image
  - — Paper with printing on the opposite side that can be seen through the front (e.g. newspaper)

1.14.8. SETTING YOUR LOGO

The logo can be your company, division or name.

1 Press [MENU].

Display: `1.SYSTEM SET UP`

2 Press [#], then [0] [2].

`YOUR LOGO`

3 Press [START/SET/COPY].

`LOGO=`

4 Enter your logo, up to 30 characters, by using the dial keypad or JOG DIAL.

Example: Bill

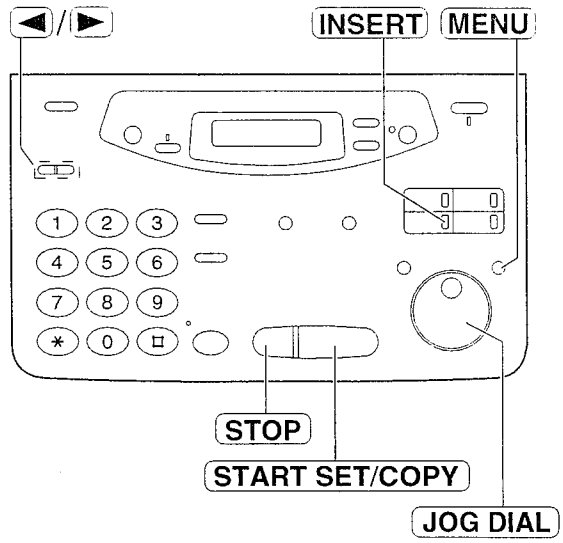
1. Press [2] twice. `LOGO=B` (Cursor)
2. Press [4] six times. `LOGO=Bi`
3. Press [5] six times. `LOGO=Bil`
4. Press [►] to move the cursor to the next space and press [5] six times.

`LOGO=Bill`

5 Press [START/SET/COPY].

`SETUP ITEM [ ]`

6 Press [MENU].



Note:

- You can enter your logo by rotating [JOG DIAL] (see the next page). If using [JOG DIAL], press [►] to move the cursor.

To correct a mistake

- Press [◄] or [►] to move the cursor to the incorrect character, then make the correction.

To delete a character

- Move the cursor to the character you want to delete and press [STOP].

To insert a character

1. Press [◄] or [►] to move the cursor to the position to the right of where you want to insert the character.
2. Press [INSERT] (One-Touch Dial key 2) to insert a space and enter the character.

1.14.9. TO SELECT CHARACTERS WITH THE DIAL KEYPAD

Pressing the dial keys will select a character as shown below.

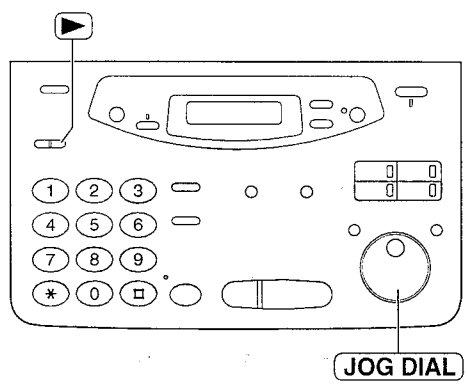
Keys		Characters
Dial keys	(1)	1 [ ] { } + – / = , . _ ` : ; ? |
	(2)	A B C a b c 2
	(3)	D E F d e f 3
	(4)	G H I g h i 4
	(5)	J K L j k l 5
	(6)	M N O m n o 6
	(7)	P Q R S p q r s 7
	(8)	T U V t u v 8
	(9)	W X Y Z w x y z 9
	(0)	0 ( ) < > ! " # $ % & ¥ * @ ^ ' →
One-Touch Dial keys	[1]	**HYPHEN** key (Used to insert a hyphen.)
	[2]	**INSERT** key (Used to insert one character or one space.)
Arrow keys	◄	◄ key (Used to move the cursor to the left.)
	►	► key (Used to move the cursor to the right.) To enter another character using the same number key, move the cursor to the next space.

Note: A hyphen entered in a telephone number is counted as two digits.

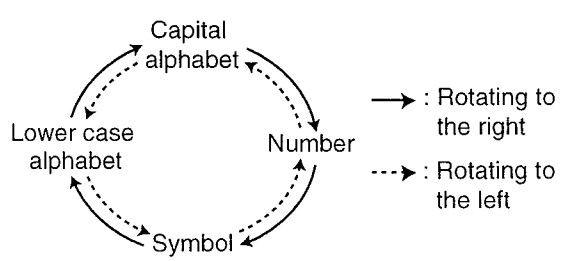
1.14.10. TO SELECT CHARACTERS USING THE JOG DIAL

Instead of pressing the dial keys, you can select characters using the JOG DIAL.

1. Rotate JOG DIAL until the desired character is displayed.
2. Press ► to move the cursor to the next space.
   - The character displayed in step 1 is inserted.
3. Return to step 1 to enter the next character.



Display order of characters



1.14.11. REPLACING THE FILM CARTRIDGE

When the unit detects the end of the film, the following message will be displayed.

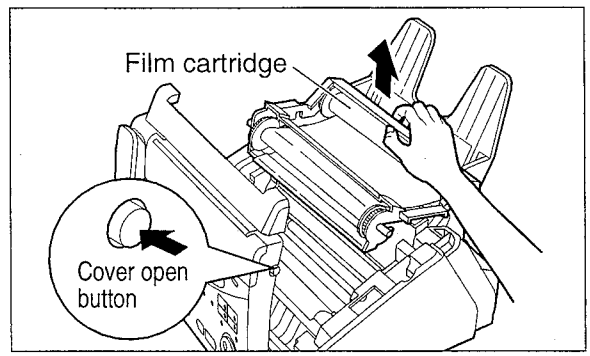
Display: `FILM NEAR EMPTY` The remaining film prints about 15 pages of letter size documents. Prepare a new film cartridge.

`FILM EMPTY` The film is empty. Install a new film cartridge.

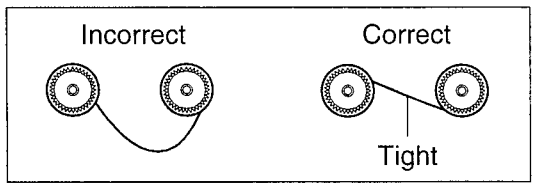
The following replacement kit is available:
KX-FA65: Film cartridge (prints about 330 letter size pages)

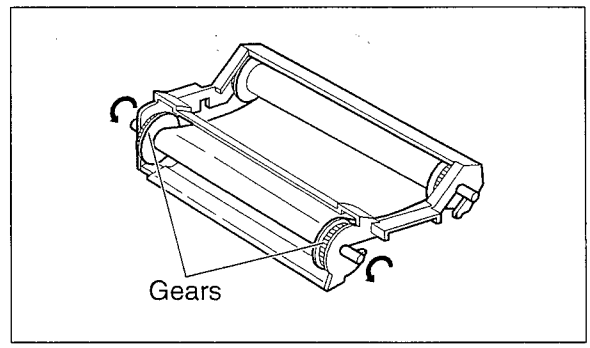
1 Open the cover by pressing the cover open button.

2 Remove the used film cartridge.



3 If the film is slack, tighten it by winding the gears.



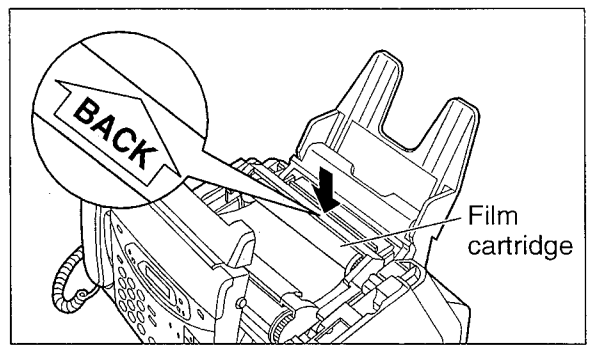


4 Insert the new film cartridge by first placing the "BACK" side of the cartridge into the unit and then lowering the front of the cartridge into place.

5 Close the cover securely by pushing down on both ends.

- The unit will check if there is no slack on the film. The following message will be displayed.

Display: `PLEASE WAIT`



•How much film you have left

To check the amount of remaining film, press **FILM REMAINING** while the unit is idle. The display indicates the approximate amount of remaining film.

Display: `FILM E▬▬▬■F`

↓

`FILM E_ F` When the film indicator points to this position, the remaining film will print up to 25 pages of letter size documents. Prepare a new film or film cartridge for replacement.

1.15. MAINTENANCE ITEMS AND COMPONENT LOCATIONS

1.15.1. OUTLINE

MAINTENANCE AND REPAIRS ARE PERFORMED USING THE FOLLOWING STEPS.

1. **Periodic maintenance**

   Inspect the equipment periodically and if necessary, clean any contaminated parts.

2. **Check for breakdowns**

   Look for problems and consider how they arose.

   If the equipment can be still used, perform copying, self testing or communication testing.

3. **Check equipment**

   Perform copying, self testing and communication testing to determine if the problem originates from the transmitter, receiver or the telephone line.

4. **Determine causes**

   Determine the causes of the equipment problem by troubleshooting.

5. **Equipment repairs**

   Repair or replace the defective parts and take appropriate measures at this stage to ensure that the problem will not recur.

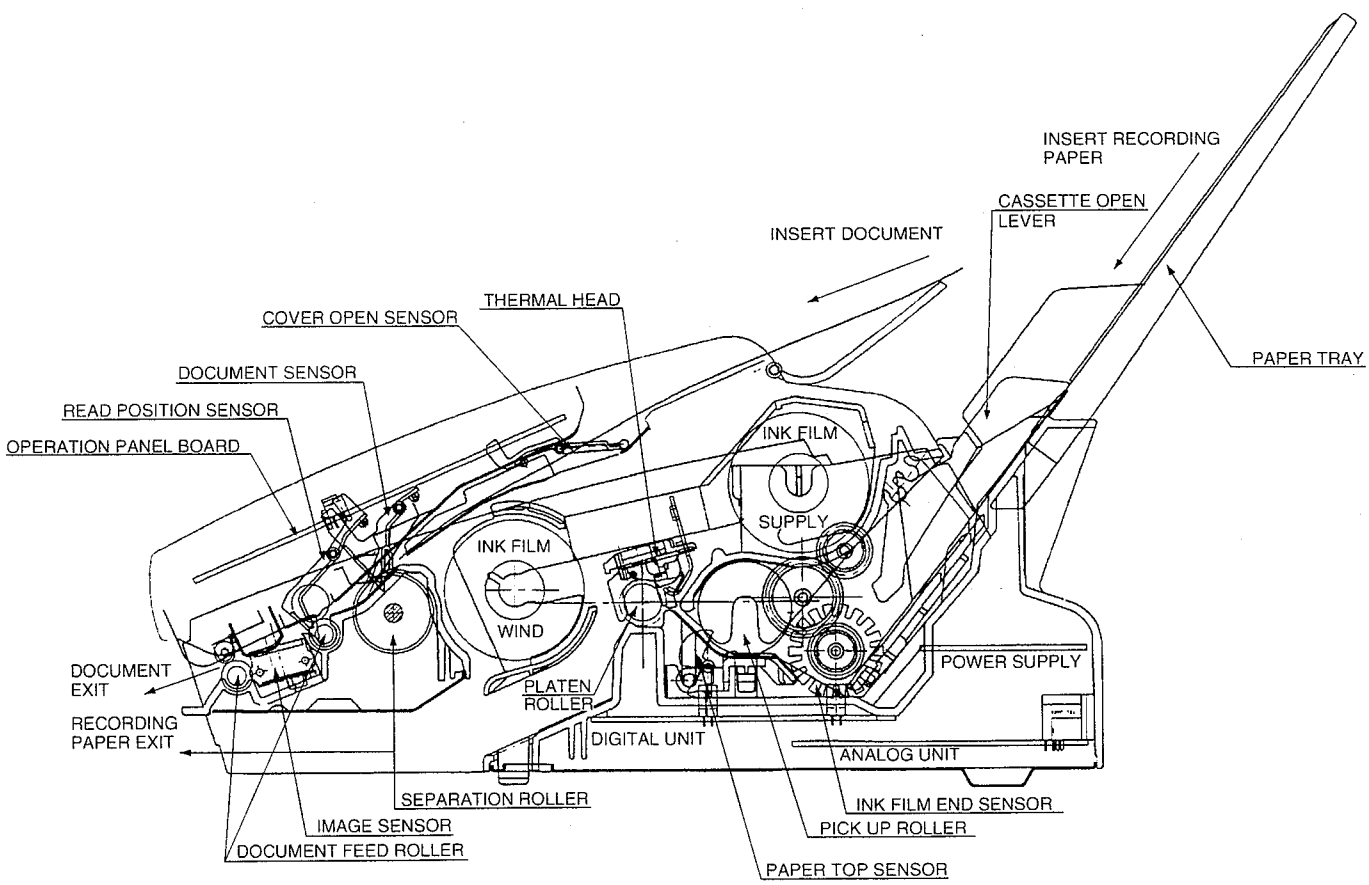
6. **Confirm normal operation of the equipment**

   After completing the repairs, conduct copying, self testing and communication testing to confirm that the equipment operates normally.

7. **Record keeping**

   Make a record of the measures taken to rectify the problem for future reference.

1.15.2. MAINTENANCE CHECK ITEMS/COMPONENT LOCATIONS



1.15.2.1. MAINTENANCE LIST

NO.	OPERATION	CHECK	REMARKS
1	Document Path	Remove any foreign matter such as paper.	—
2	Rollers	If the roller is dirty, clean it with a damp cloth then dry thoroughly.	See **1.15.3. MAINTENANCE**.
3	Platen Roller	If the platen is dirty, clean it with a damp cloth then dry thoroughly. Remove the paper and film cartridge before cleaning.	—
4	Thermal Head	If the thermal head is dirty, clean the printing surface with a cloth moistened with denatured alcohol (alcohol without water), then dry thoroughly.	See **1.15.3. MAINTENANCE** and **4. DISASSEMBLY INSTRUCTIONS**.
5	Glass, White Plate	If the glass and the white plate are dirty, clean them with a dry soft cloth.	See **1.15.3. MAINTENANCE** and **4. DISASSEMBLY INSTRUCTIONS**.
6	Sensors	Document sensor (PI302), Read position sensor (PI301), Hook switch (SW401), Paper top sensor (PI402), Film end sensor (PI403), Cover open sensor (PI303) and Paper set switch (SW101). Confirm the operation of the sensors.	See **1.15.2. MAINTENANCE CHECK ITEMS/COMPONENT LOCATIONS** or **2.3.3.9. Sensor Board Section** and **6.5. SENSORS AND SWITCHES**.
7	Mirrors and Lens	If the mirrors and lens are dirty, clean them with a soft dry cloth.	—
8	Abnormal, wear and tear or loose parts	Replace the part. Check if the screws are tight on all parts.	—

1.15.2.2. MAINTENANCE CYCLE

No.	Item	Cleaning		Replacement	
		Cycle	Procedure	Cycle	Procedure
1	Separation Roller (Ref. No. 173)	3 months	See **1.15.3. MAINTENANCE**.	7 years* (100,000 documents)	See **4. DISASSEMBLY INSTRUCTIONS**.
2	Separation Rubber (Ref. No. 44)	3 months	See **1.15.3. MAINTENANCE**.	7 years (100,000 documents)	See **4. DISASSEMBLY INSTRUCTIONS**.
3	Feed Rollers (Ref. No. 109)	3 months	See **1.15.3. MAINTENANCE**.	7 years (100,000 documents)	See **4. DISASSEMBLY INSTRUCTIONS**.
4	Thermal Head (Ref. No. 51)	3 months	See **1.15.3. MAINTENANCE**.	7 years (100,000 documents)	See **4. DISASSEMBLY INSTRUCTIONS**.
5	Platen Roller (Ref. No. 102)	3 months	See **4. DISASSEMBLY INSTRUCTIONS**.	7 years (100,000 documents)	See **4. DISASSEMBLY INSTRUCTIONS**.
6	Pickup Roller (Ref. No. 134)	3 months	See **4. DISASSEMBLY INSTRUCTIONS**.	7 years (100,000 documents)	See **4. DISASSEMBLY INSTRUCTIONS**.

* These values are standard and may vary depending on usage conditions.

1.15.3. MAINTENANCE

1.15.3.1. CLEANING THE DOCUMENT FEEDER UNIT

If misfeeding occurs frequently or if dirty patterns or black bands appear on a copied or transmitted document, clean the document feeder.

1 **Disconnect the power cord and the telephone line cord.**

2 Open the cover by pressing the cover open button.

3 Clean the document feeder rollers, sub roller and rubber flap with a cloth moistened with isopropyl rubbing alcohol, and let all parts dry thoroughly.

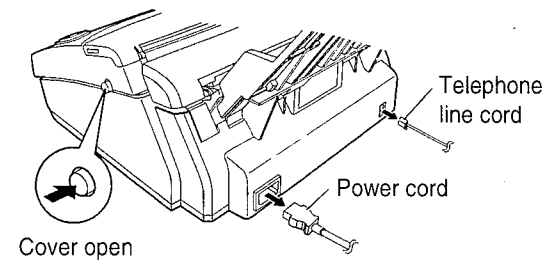
4 Clean the white plate and glass with a soft dry cloth.

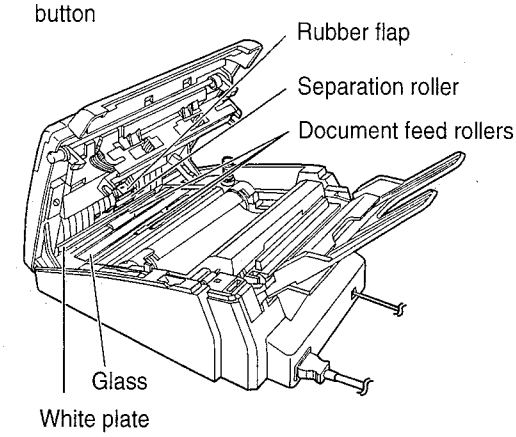
5 Close the cover securely by pushing down on both ends.

6 Connect the power cord and the telephone line cord.

Caution:

- **Do not use paper products, such as paper towels or tissues, to clean the inside of the unit.**





1.15.3.2. CLEANING THE THERMAL HEAD AND BLACK BAR

If dirty patterns or black or white bands appear on a copied or received document, clean the thermal head and black bar.

1 **Disconnect the power cord and the telephone line cord.**

2 Open the cover by pressing the cover open button.

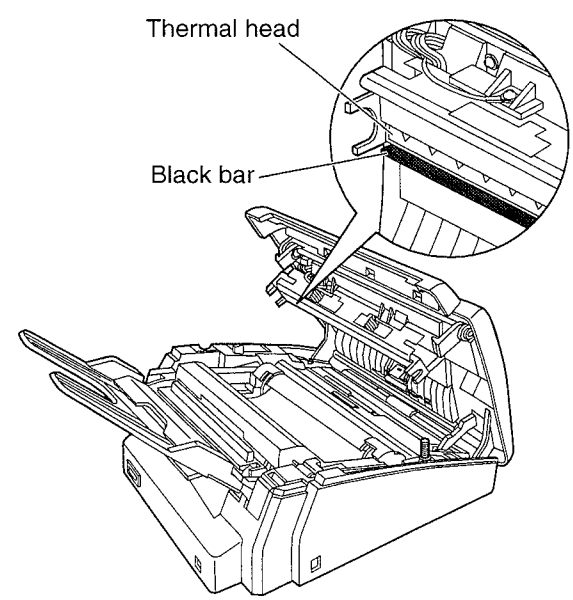
3 Clean the thermal head and black bar with a cloth moistened with isopropyl rubbing alcohol, and let it dry thoroughly.

4 Close the cover securely by pushing down on both ends.

5 Connect the power cord and the telephone line cord.

Caution:

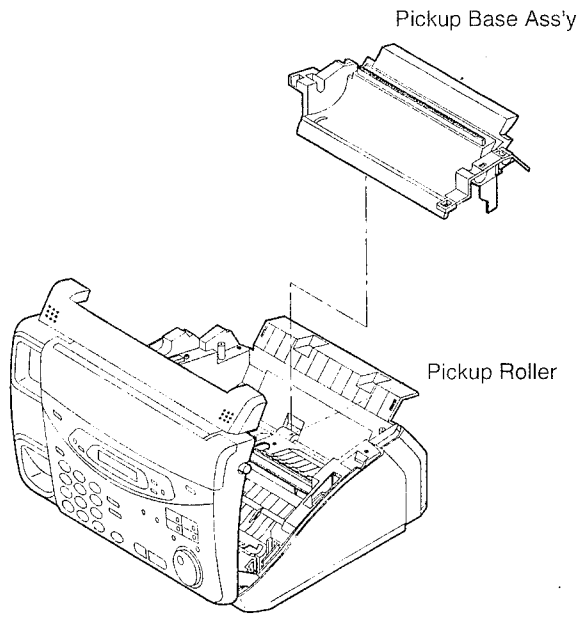
- **To prevent a malfunction due to static electricity, do not use a dry cloth and do not touch the thermal head directly with your fingers.**



1.15.3.3. CLEANING THE PICKUP ROLLER

If misfeeding occurs frequently or if spots or black bands appear on a copied or received paper, clean the Pickup roller.

1. Disconnect the power cord and the telephone line cord.
2. Open the cover by pressing the cover open button, take out the film cartridge and then remove the Pickup Base Ass'y.
3. Clean the Pickup Roller bar with a cloth moistened with isopropyl rubbing alcohol, and let it dry thoroughly.
4. Install the Pickup Base Ass'y into the main cabinet and set the film cartridge. Close the cover securely by pushing down on both ends.
5. Connect the power cord and the telephone line cord.



Caution:

- **To prevent a malfunction due to static electricity, do not use a dry cloth and do not touch the thermal head directly with your fingers.**

2 TROUBLESHOOTING GUIDE

2.1. TROUBLESHOOTING SUMMARY

2.1.1. TROUBLESHOOTING

After confirming the problem by asking the user, troubleshoot according to the instructions and observe the following precautions.

2.1.2. PRECAUTIONS

1. If there is a problem with the print quality or the paper feed, first check if the installation space and the print paper meets the specifications, the paper selection lever/paper thickness lever is set correctly, and the paper is set correctly without any slack.
2. Before troubleshooting, first check that the connectors and cables are connected correctly (not loose).
   If the problem occurs randomly, check it very carefully.
3. When connecting the AC power cord with the unit and checking the operation, exercise utmost care when handling electric parts in order to avoid electric shocks and short-circuits.
4. After troubleshooting, double check that you have not forgotten any connectors, left any loose screws, etc.
5. Always test to verify that the unit is working normally.

2.1.3. WHEN YOU DON'T KNOW HOW TO OPERATE THE UNIT, USE THE HELP FUNCTION

• How to use:

1. Press [HELP].
2. Press [▲] or [▼] until the desired item is displayed.
3. Press [START/SET/COPY].

2.2. USER RECOVERABLE ERRORS

If the unit detects a problem, one or more of the following messages will appear on the display.

DISPLAY MESSAGE	CAUSE AND REMEDY
CALL SERVICE	• There is something wrong with the unit. Contact our service personnel. [This error is displayed when the thermal head does not warm up. Check the thermistor on the thermal head and connector lead. (for technicians)]
CHECK COVER	• The cover is open. Close it.
CHECK DOCUMENT	• The document is not fed into the unit properly. Reinsert the document. If misfeeding occurs frequently, clean the document feeder rollers and try again. If the problem remains, adjust the feeder pressure. (Refer to page 113.)
CHECK MEMORY	• Memory (telephone numbers, parameters, etc.) has been erased. Re-program. [The backup battery on the top of the digital board may be low or dead, so check it.]
CHECK PAPER	• The recording paper is not installed or the unit ran out of paper. Install paper and press (START/SET/COPY) to clear the message. • The recording paper is not fed into the unit properly or has jammed near the recording paper entrance. Clear the jammed paper and press (START/SET/COPY) to clear the message. Do not install folded or heavily curled paper in the paper tray.
FAX IN MEMORY	• The unit has (a) document(s) in memory. See the other message instructions to print out the document(s).
FAX MEMORY FULL	• Memory is full of received documents due to lack of recording paper or a recording paper jam, etc. Install paper or clear the jammed paper. • When performing memory transmission, the document being stored exceeds the memory capacity of the unit. Transmit the entire document by using manual or automatic transmission.
FILM EMPTY	• The film is empty. Replace the film or film cartridge with a new one. • The film is slack. Tighten it and install again.
FILM NEAR EMPTY	• The remaining film can print about 15 pages of letter size documents. Prepare a new film cartridge.
FREE FILM EMPTY	• The free starter film is empty. Replace the film cartridge with a new one.
JOG-DIAL FULL	• There is no space to store new stations in the JOG DIAL directory. Edit or erase unnecessary stations.
LOADING ERROR	• A loading error occurred while receiving IQ-data from *fax*SĀV®. • [Refer to **1.8. FEATURES** for details on the *fax*SĀV® service.]
MESSAGE FULL	• There is no room left in memory to record a voice message. Erase some or all of the messages.
NO FAX REPLY	• The other party's fax machine is busy or ran out of recording paper. Try again.
PAPER JAMMED	• A recording paper jam occurred under the film cartridge. Clear the jammed paper. [If the printout jams, please refer to **2.2.1. Paper Jam**.]

Trademark

*fax*SĀV is a registered trademark of FaxSav Incorporated.

DISPLAY MESSAGE	CAUSE AND REMEDY
PLEASE WAIT	• The unit is checking if there is no slack on the film. Wait for a while.
REDIAL TIME OUT	• The other party's fax machine is busy or ran out of recording paper. Try again.
REMOVE DOCUMENT	• The document is jammed. Remove the jammed document. • Attempted to transmit a document longer than 600 mm ($23^{5}/_{8}$"). Press the STOP button to remove the document. Divide the document into two or more sheets and try again. [Alternately, turn off service code #559 to enable sending of documents longer than 600 mm.]
TRANSMIT ERROR	• A transmission error occurred. Try again.
UNIT OVERHEATED	• The unit is too hot. Let the unit cool down. [If many copies are nearly all black, this message will be displayed. When this occurs, open the front cover and let the unit cool down.]

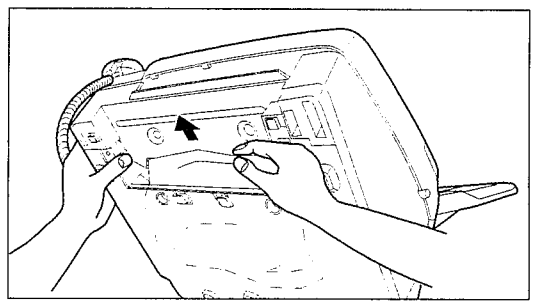
Note:

The explanations given in the [ ] are for servicemen only.

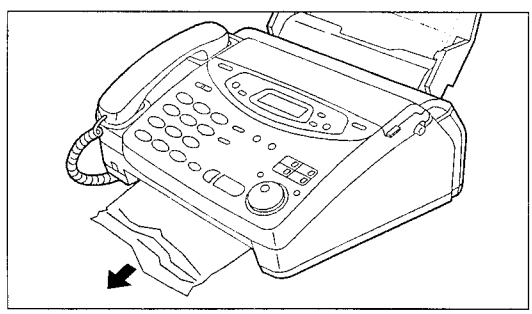
2.2.1. PAPER JAM

Confirm the recording paper exit. If there is a jammed paper, remove it as follows:

1 Tilt the unit up and pull the jammed recording paper out of the recording paper exit.



2 Remove the jammed recording paper from the recording paper exit.



2.2.2. RECORDING PAPER JAMS

If the unit does not eject any recording paper during reception or copying, the recording paper has jammed. Remove the jammed paper.

When paper has jammed under the film cartridge

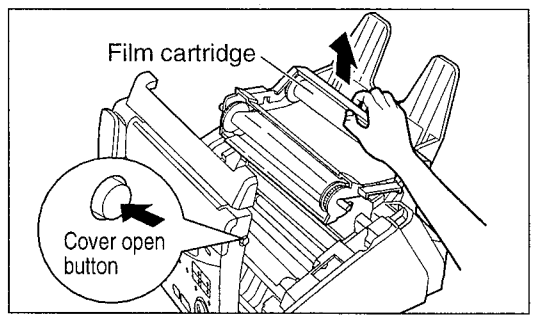
The display will show the following message.

Display: PAPER JAMMED

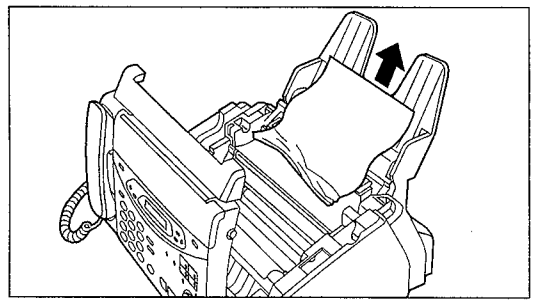
Remove the jammed paper as follows.

1 Open the cover by pressing the cover open button.

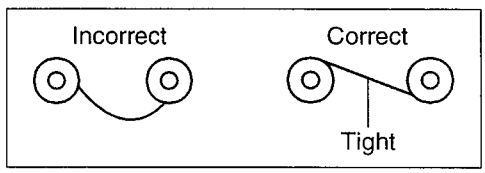
2 Remove the film cartridge.

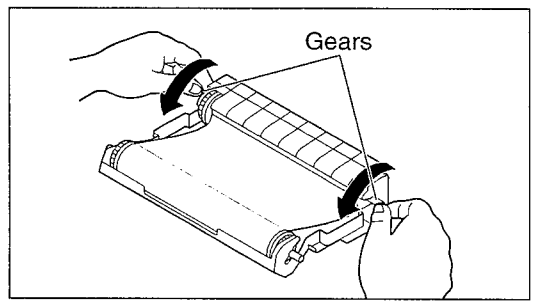


3 Remove the jammed recording paper.



4 If the film is slack, turn the film cartridge over and tighten it by winding the gears.

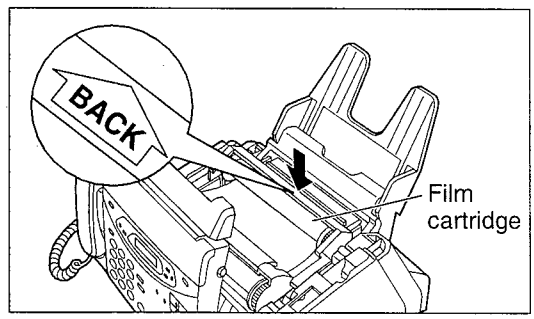




5 Turn the film cartridge over so that the "BACK" is facing up.

6 Replace the film cartridge by first placing the front of the cartridge into the unit and then lowering the "BACK" of the cartridge into place.

7 Close the cover securely by pushing down on the dotted area at both ends.



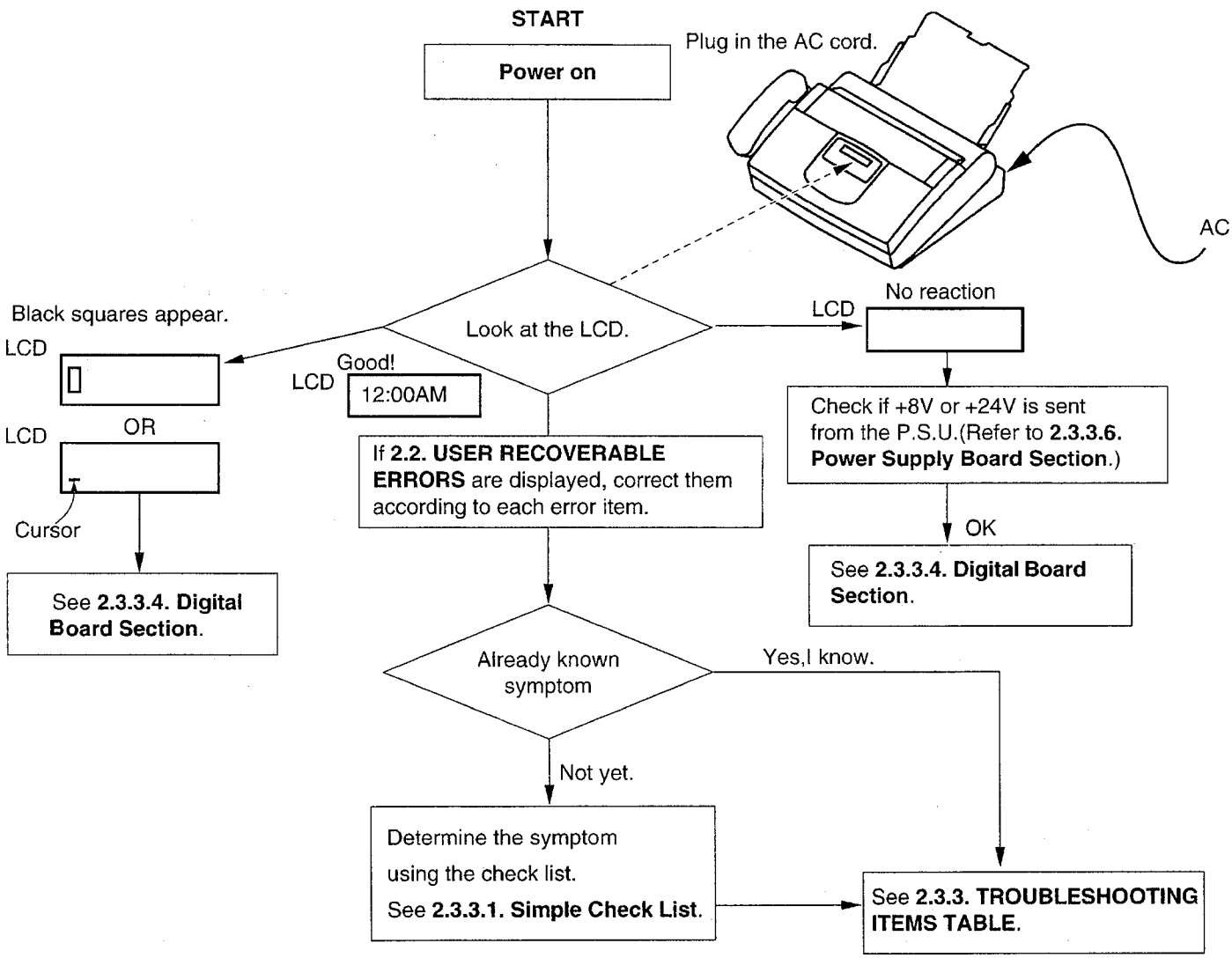
2.3. TROUBLESHOOTING DETAILS

2.3.1. OUTLINE

Troubleshooting is for recovering quality and reliability by determining the broken component and replacing, adjusting or cleaning it as required. First, determine the problem then decide the troubleshooting method. If you have difficulty finding the broken part, determine which board is broken. (For example: the Digital PCB, Analog PCB, etc.) The claim tag from a customer or dealer may use different expressions for the same problem, as they are not a technician or engineer. Using your experience, test the problem area corresponding to the claim. Also, returns from a customer or dealer often have a claim tag. For these cases as well, you need to determine the problem. Test the unit using **2.3.3.1. Simple Check List**. Difficult problems may be hard to determine, so repeated testing is necessary.

2.3.2. STARTING TROUBLESHOOTING

Determine the symptom and the troubleshooting method.



2.3.3. TROUBLESHOOTING ITEMS TABLE

ITEM	SYMPTOM	REFERENCE
ADF (Auto Document Feeder)	The document does not feed. Document jam Multiple feed Skew	See **2.3.3.2. ADF (Auto document feed) Section**.
Recording paper feed	The recording paper does not feed. Paper jam Multiple feed and skew	See **2.3.3.2. ADF (Auto document feed) Section**.
Printing	The sent fax data is skewed. The received fax data is skewed. The received or copied data is expanded. A blank page is copied. A blank page is received. Black or white vertical line Black or white lateral line An abnormal image is printed.	See **2.3.3.2. ADF (Auto document feed) Section**.
Communication FAX, TEL (analog board)	Cannot communicate by fax. An error code is displayed.	See **2.3.3.3. Communication Section**.
	Cannot talk. The DTMF tone doesn't work. The handset/monitor doesn't work, etc.	See **2.3.3.5. Analog Board Section**.
Operation panel	Keys are not accepted.	See **2.3.3.7. Operation Panel Section**.
Sensor	If the electric circuit is the cause, the error message corresponding to the sensor will be displayed.	See **2.3.3.8. Sensor Board Section**.

2.3.3.1. Simple Check List

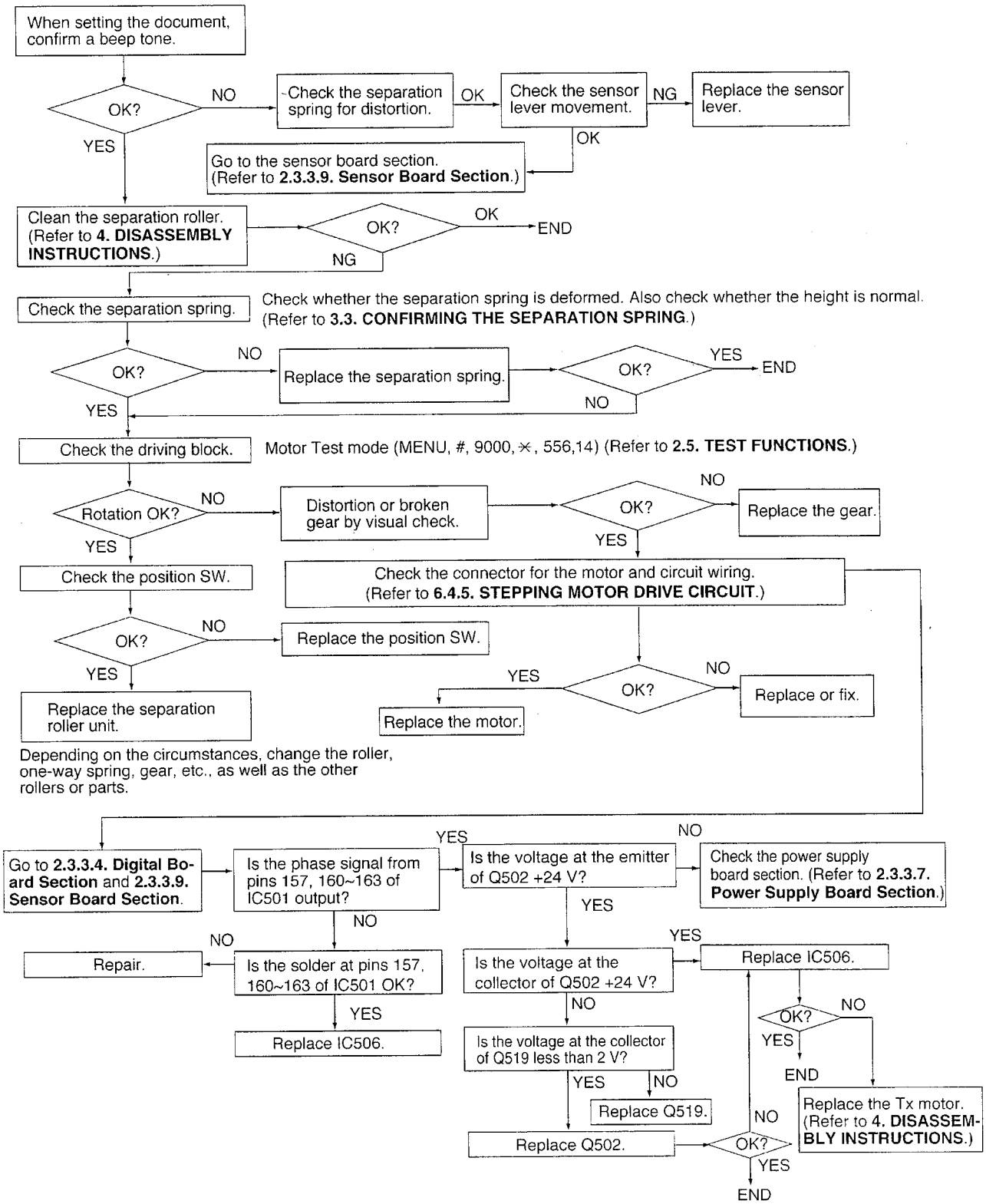
SERIAL NO. _____ DATE _____

FUNCTION		JUDGEMENT	REFERENCE
FAX operaton	Transmission	OK / NG	
	Receiving	OK / NG	
Copy operation		OK / NG	
Telephone operation	Handset transceiver/ receiver	OK / NG	
	SP-PHONE sound	OK / NG	
	Ringer sound	OK / NG	
	Dial operation	OK / NG	
	Volume operation	OK / NG	
	VOX detection	OK / NG	Service code 815※
Operation panel	Key check	OK / NG	Service code 561※
	LED check	OK / NG	Service code 557※
	LCD check	OK / NG	Service code 558※
Sensor	Sensor check	OK / NG	Service code 815※
Clock	Sensor check	OK / NG	Is the time kept correctly? Check with another clock.
Digital Speaker phone		OK / NG	
Digital TAM	Greeting Rec/Play	OK / NG	
	Incoming message Rec/Play	OK / NG	
	Memo Rec/Play	OK / NG	
Voice prompt		OK / NG	SERVICE CODE 784 Check whether voice prompt is play or not.

※Check according to the service code referring to **2.5. TEST FUNCTIONS**.

2.3.3.2. ADF (Auto document feed) section

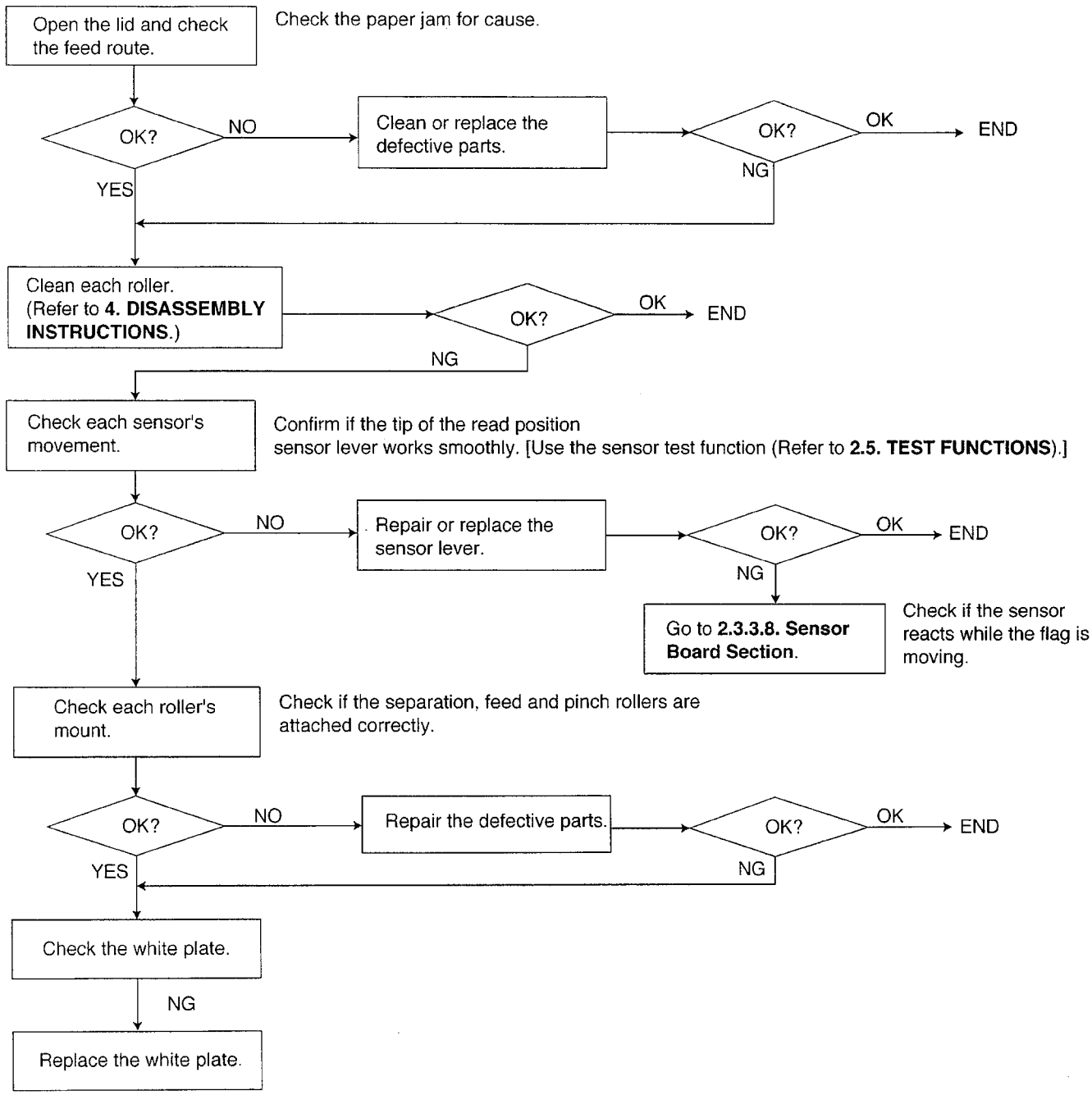
1. No document feed



Note:

When using thin paper etc., sometimes the document will not feed. Refer to 3.2. ADJUSTING THE FEEDER PRESSURE.

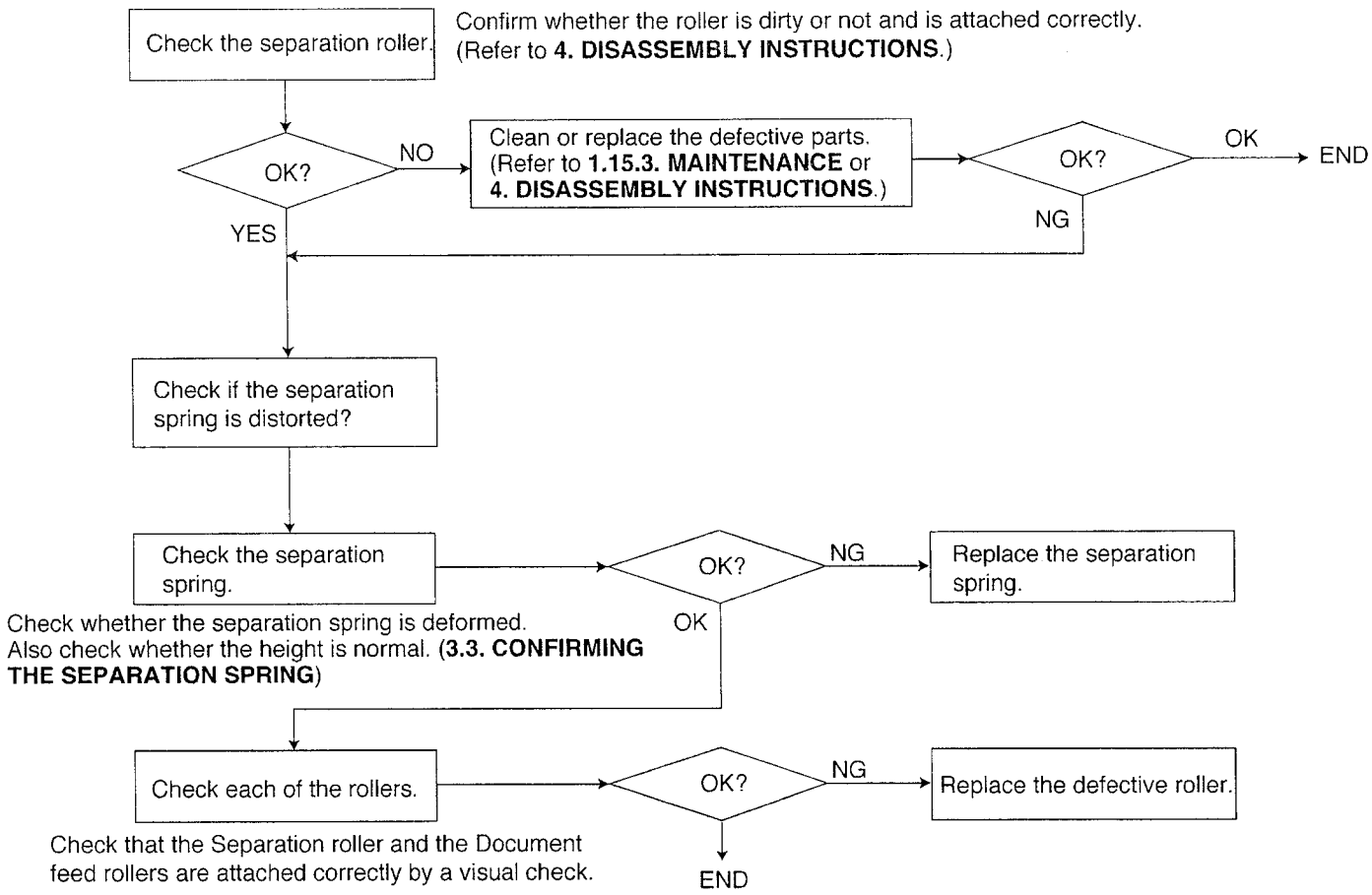
2. **Document JAM**



3. **Multiple feed**

- When using thick paper etc., sometimes the document will not be fed.

  Refer to the feed pressure adjustment (**3.2. ADJUSTING THE FEEDER PRESSURE**).


Check the separation roller.
Confirm whether the roller is dirty or not and is attached correctly. (Refer to 4. DISASSEMBLY INSTRUCTIONS.)
OK?
NO
Clean or replace the defective parts. (Refer to 1.15.3. MAINTENANCE or 4. DISASSEMBLY INSTRUCTIONS.)
OK?
OK
END
NG
YES
Check if the separation spring is distorted?
Check the separation spring.
OK?
NG
Replace the separation spring.
Check whether the separation spring is deformed. Also check whether the height is normal. (3.3. CONFIRMING THE SEPARATION SPRING)
OK
Check each of the rollers.
OK?
NG
Replace the defective roller.
Check that the Separation roller and the Document feed rollers are attached correctly by a visual check.
END

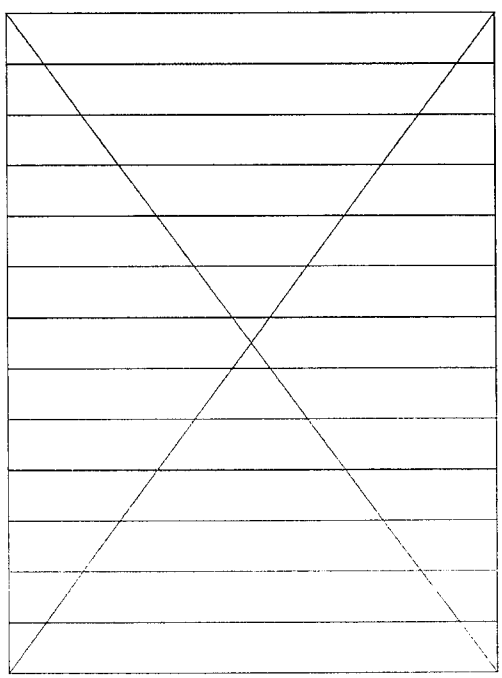
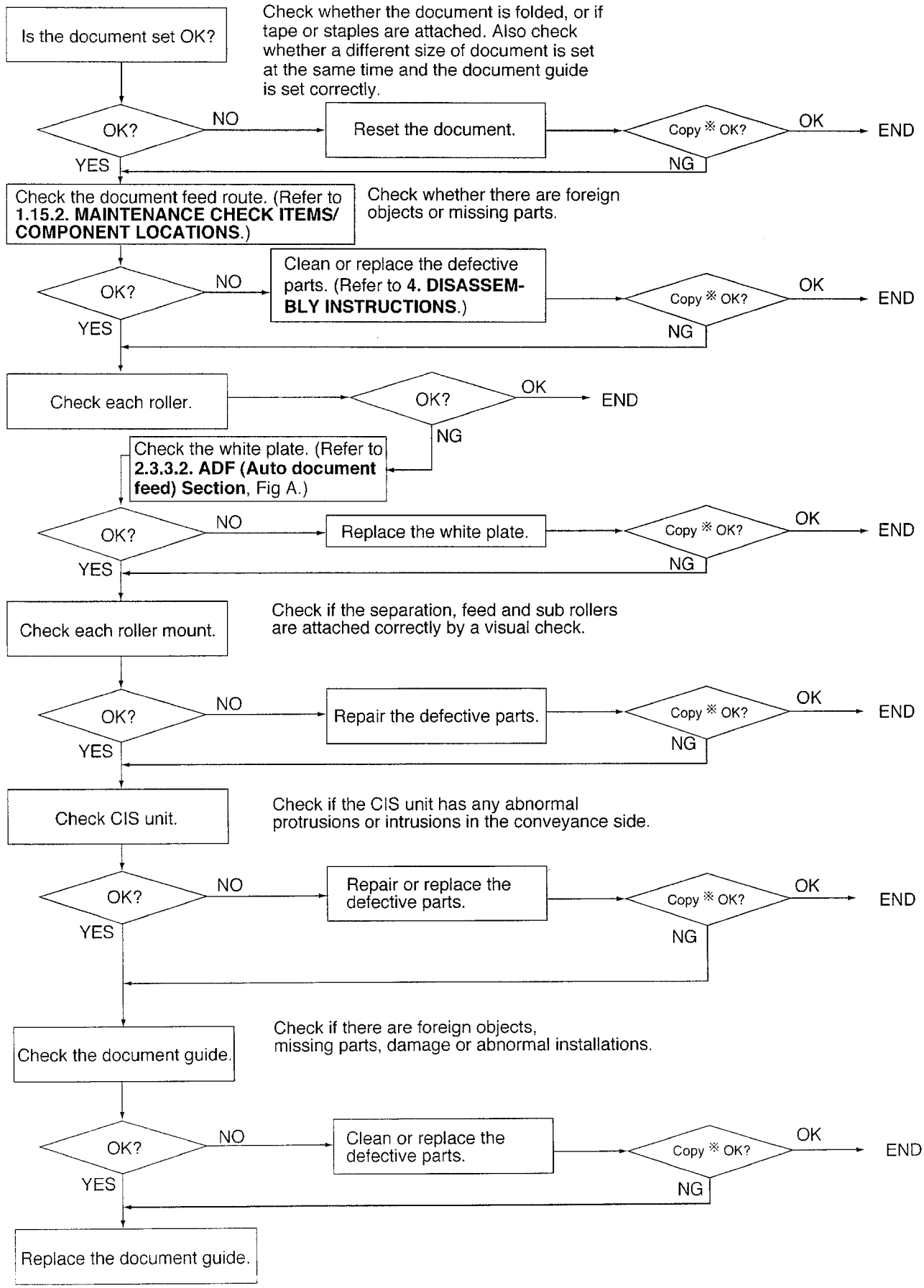


Fig. B

Note:

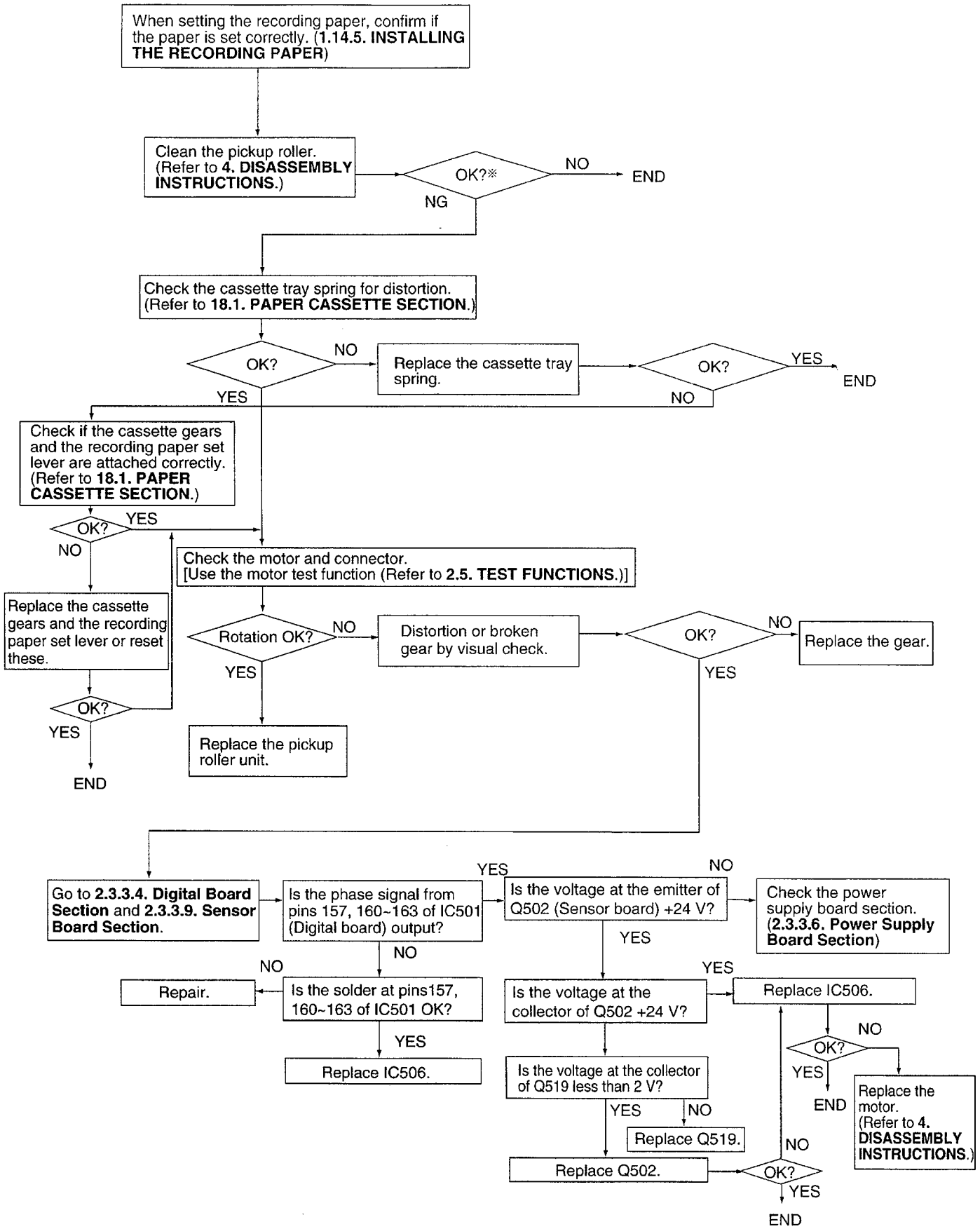
When confirming if the characters are expanded or distorted, or if the feed problem occurs, use this test chart format (Fig. B).

4. **Skew**



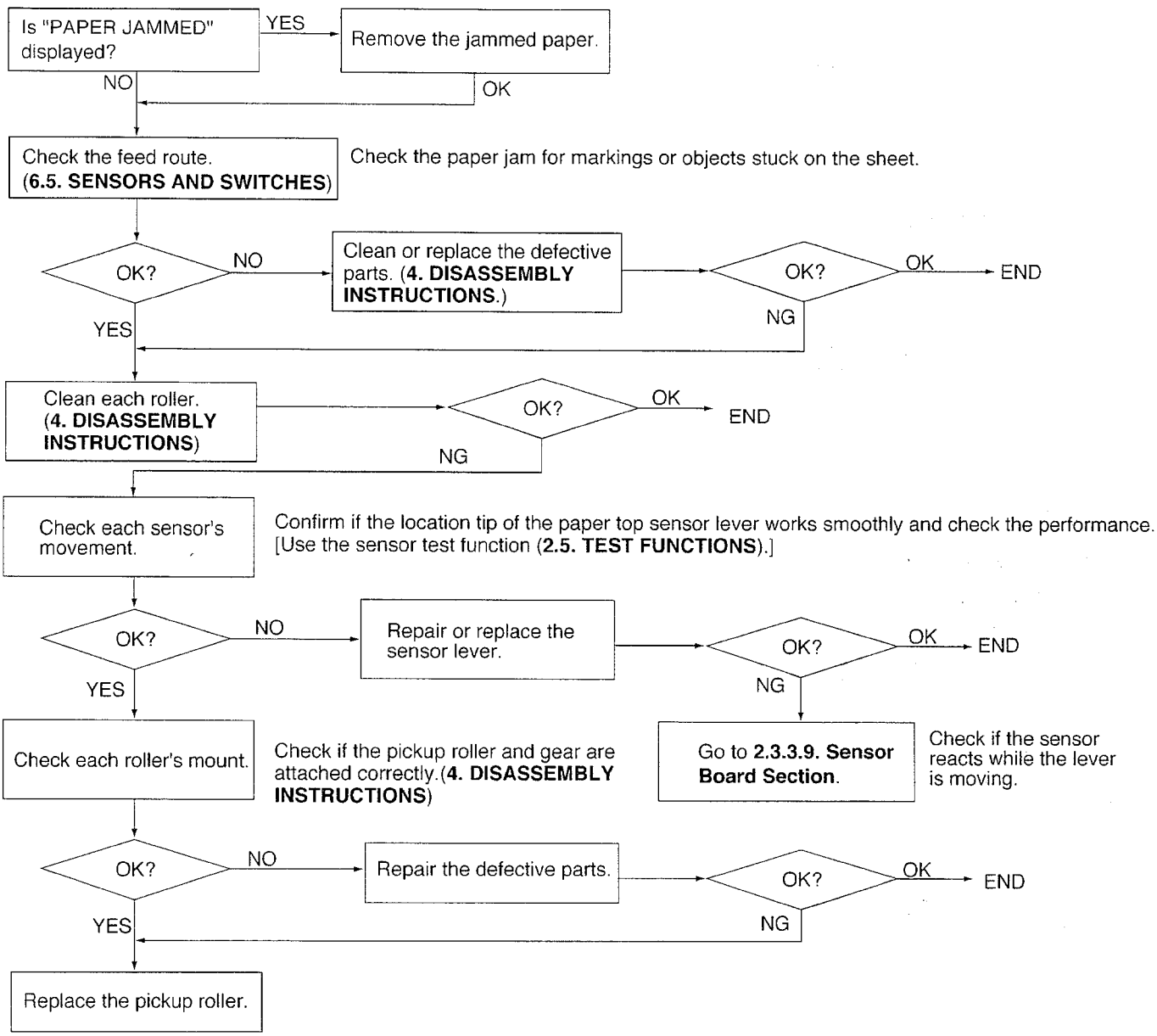
※We recommend making a copy of the Fig. B document in "**3. Multiple feed**" and using it.

5. **The recording paper does not feed.**

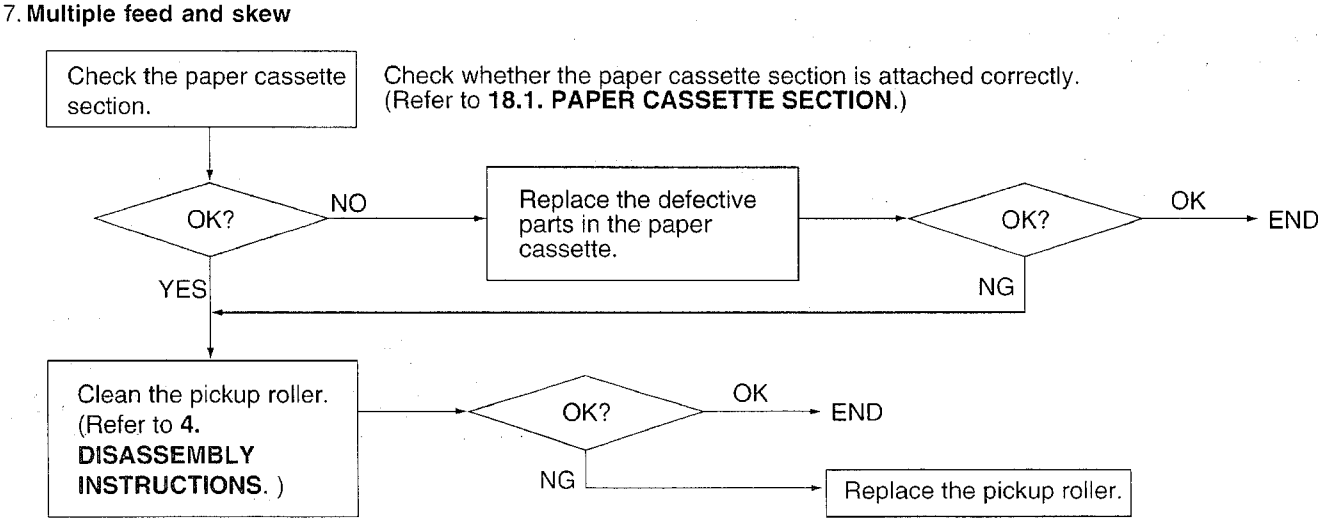


※We recommend making a copy of the Fig. B document in "**3. Multiple feed**" and using it.

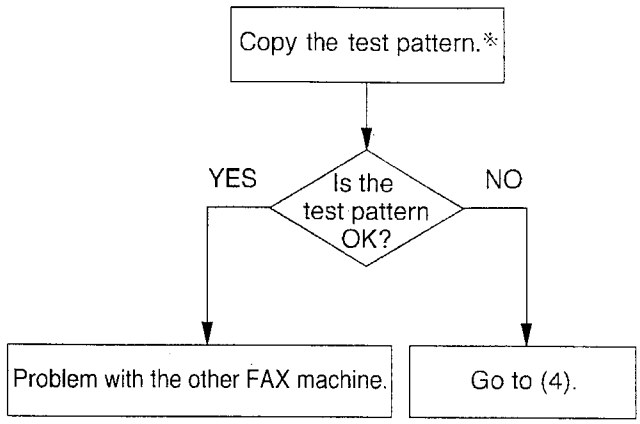
6. **Paper JAM**



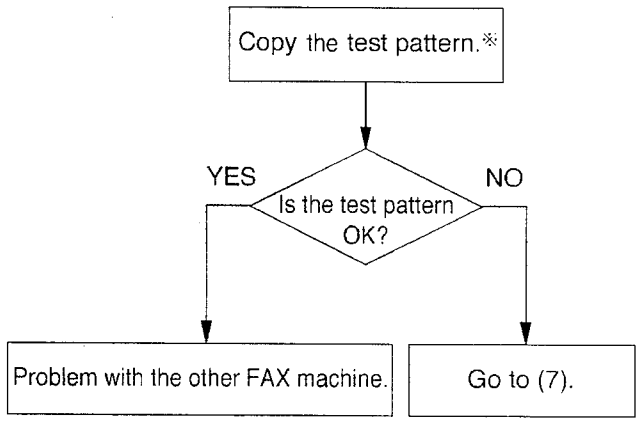
7. **Multiple feed and skew**



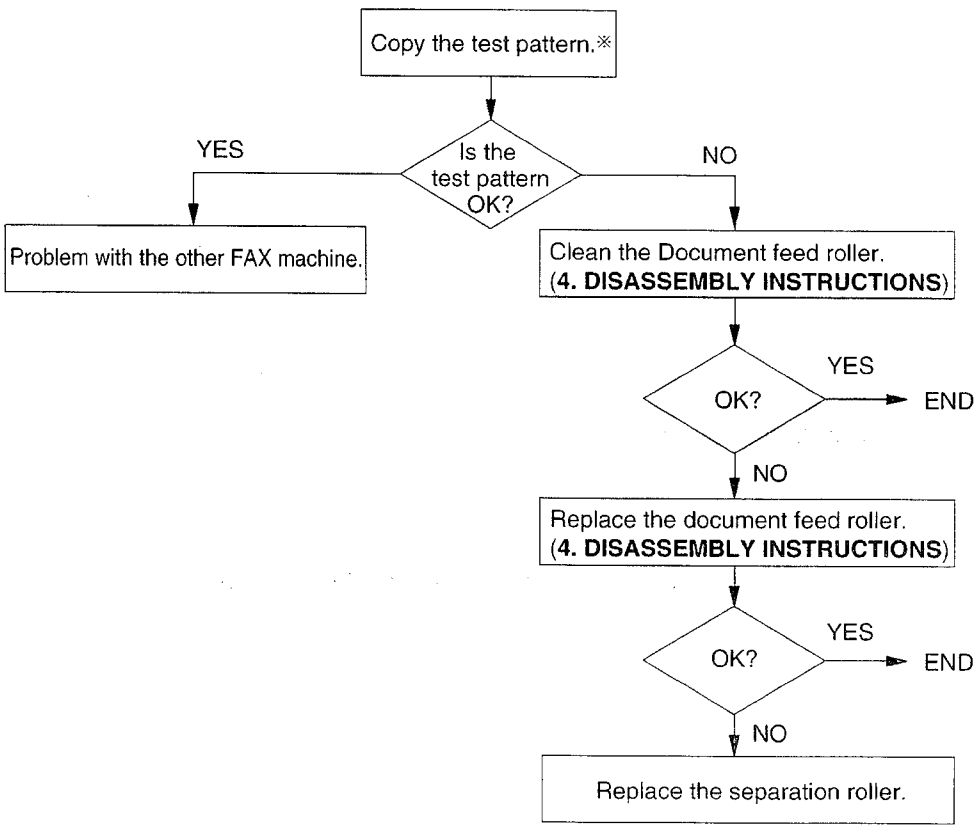
8. **The sent fax data is skewed.**



9. **The received fax data is skewed.**



10. **Received or copied data is expanded.**



※We recommend making a copy of the Fig. B document in "**3. Multiple feed**" and using it.

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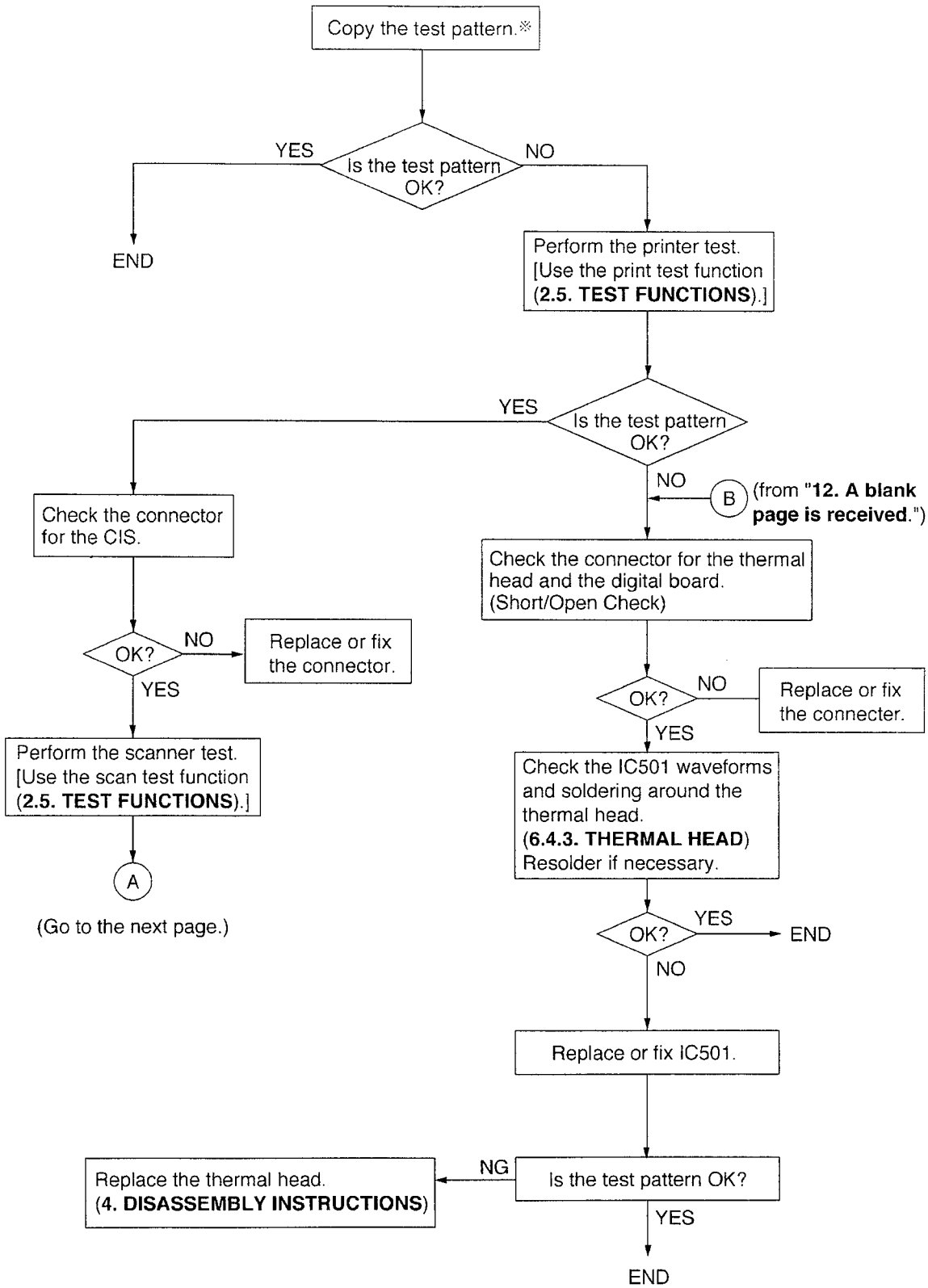
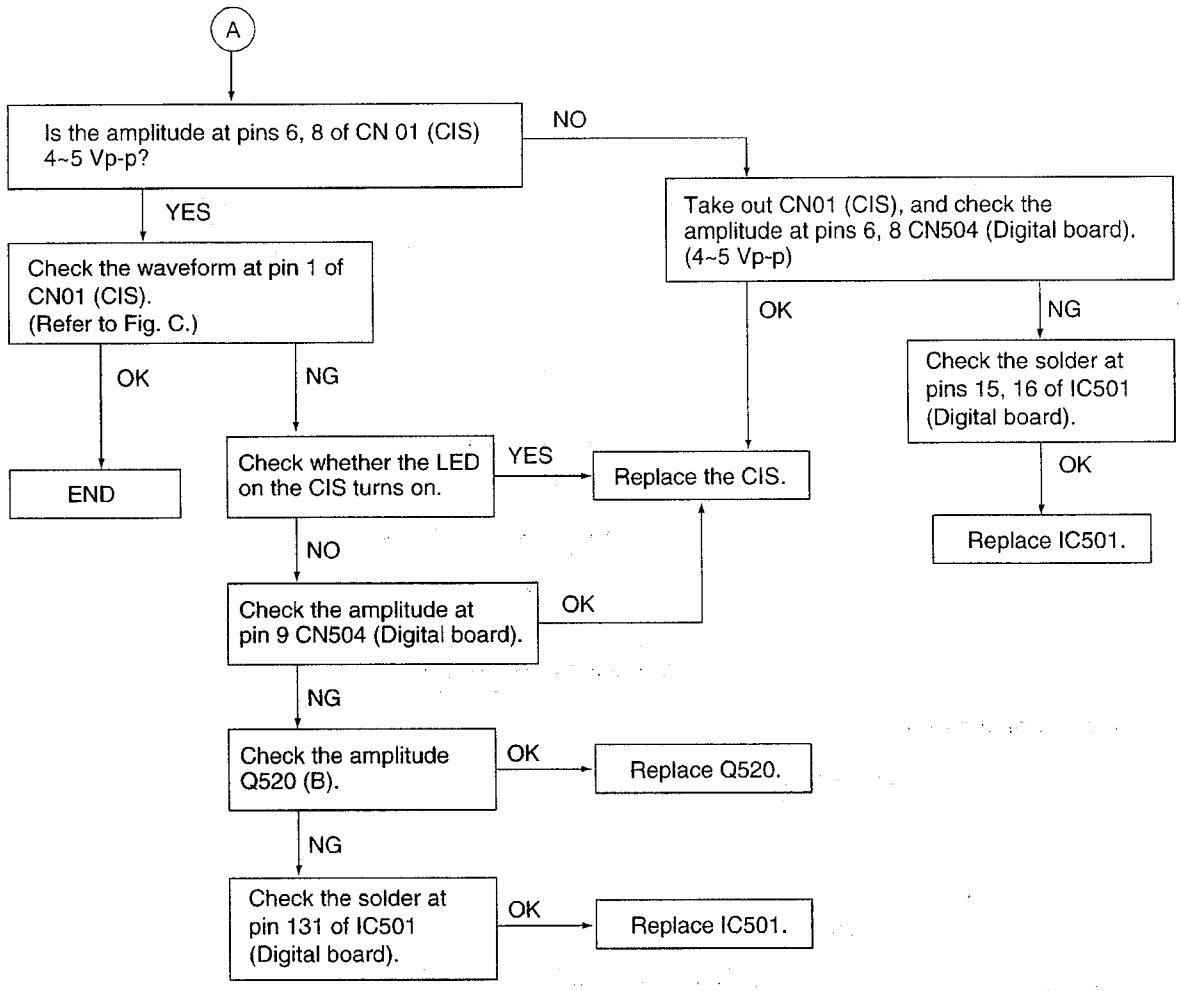
11. **A blank page is copied.**



※We recommend making a copy of the Fig. B document in "**3. Multiple feed**" and using it.

(From the previous page)



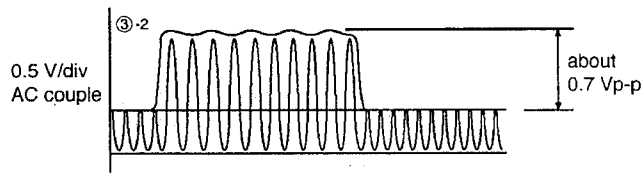
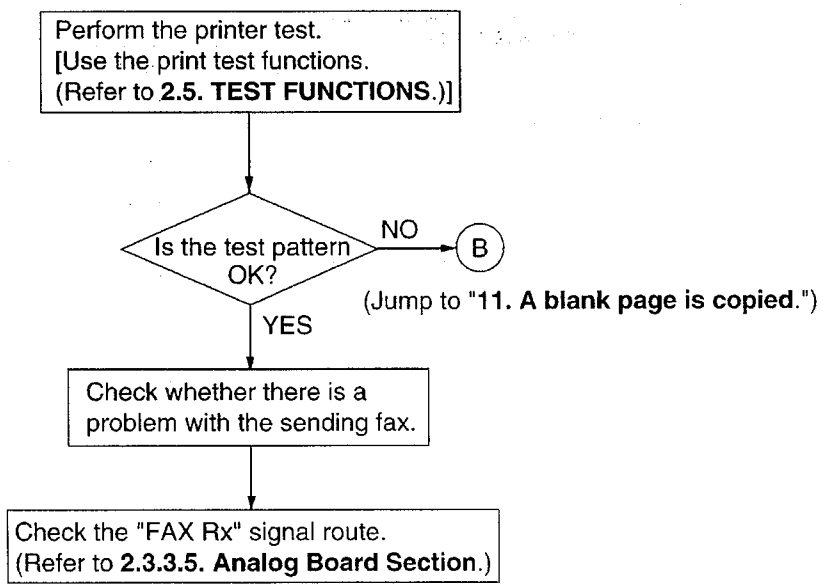
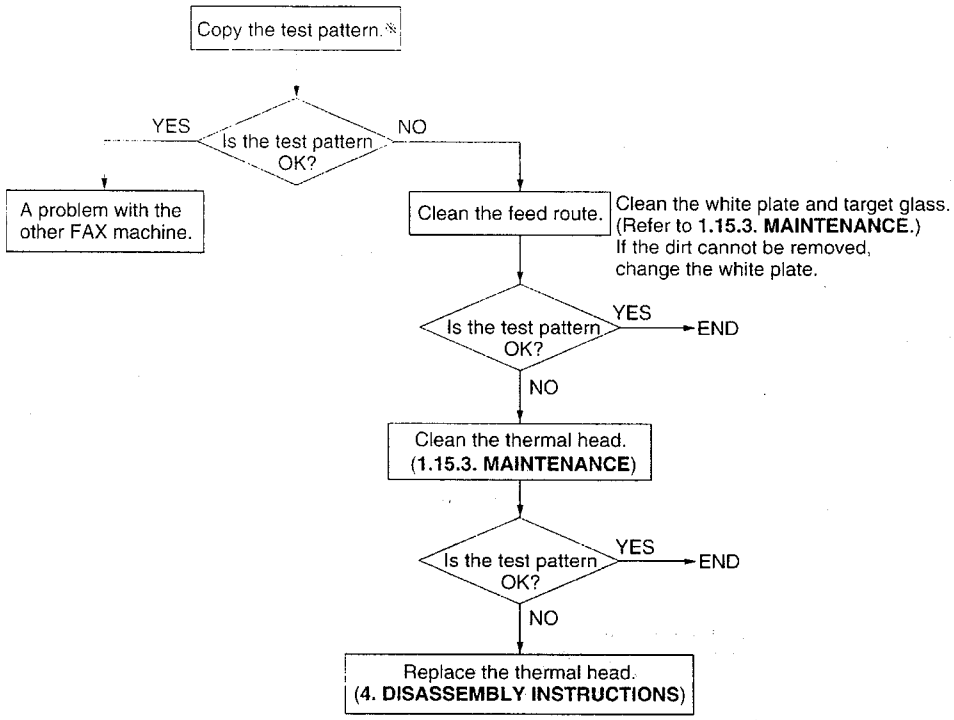


Fig. C

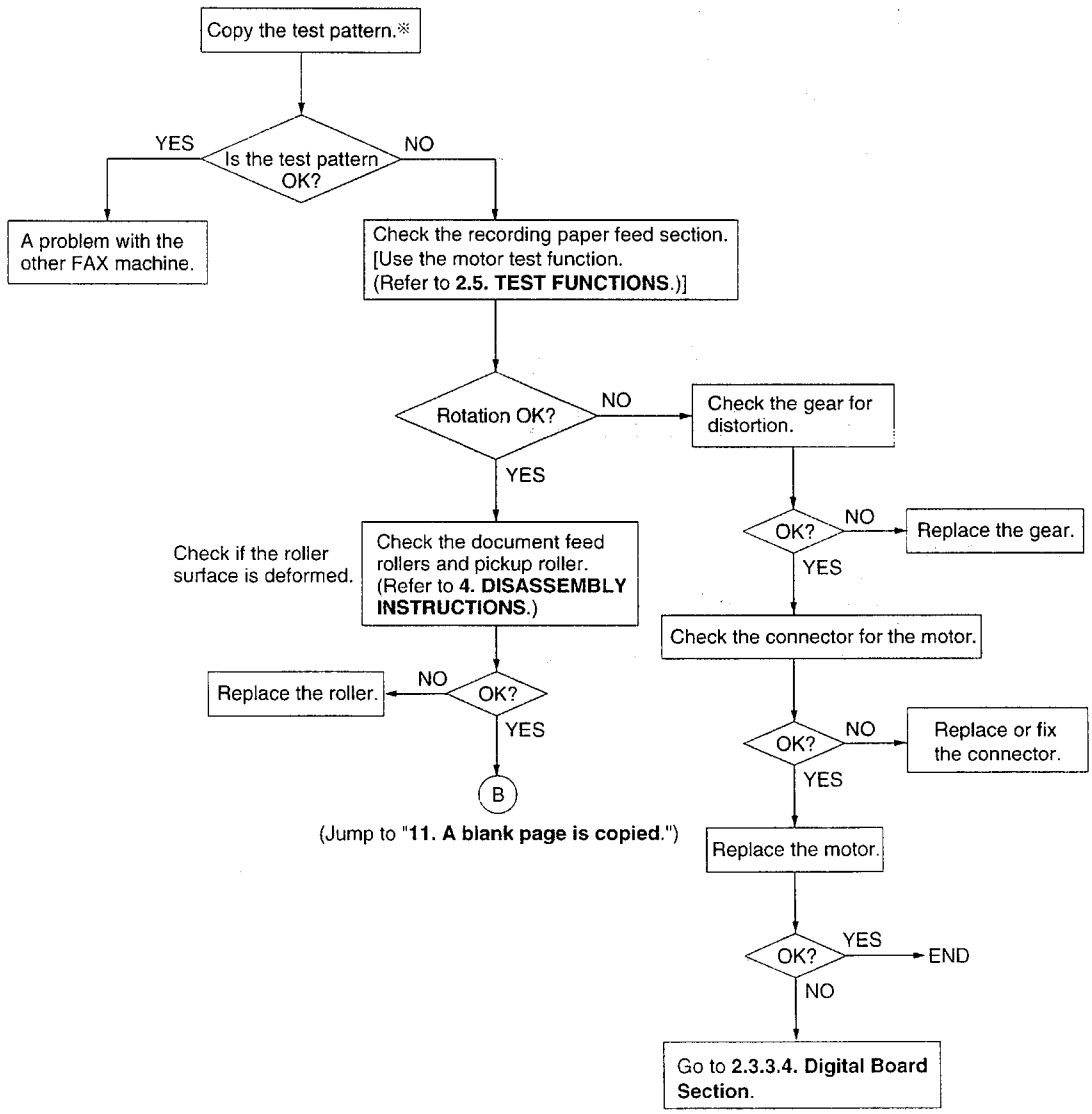
12. **A blank page is received.**


Perform the printer test.
[Use the print test functions.
(Refer to **2.5. TEST FUNCTIONS.**)]
Is the test pattern OK?
NO
B
(Jump to "**11. A blank page is copied.**")
YES
Check whether there is a problem with the sending fax.
Check the "FAX Rx" signal route.
(Refer to **2.3.3.5. Analog Board Section.**)

13. **Black or white vertical line**

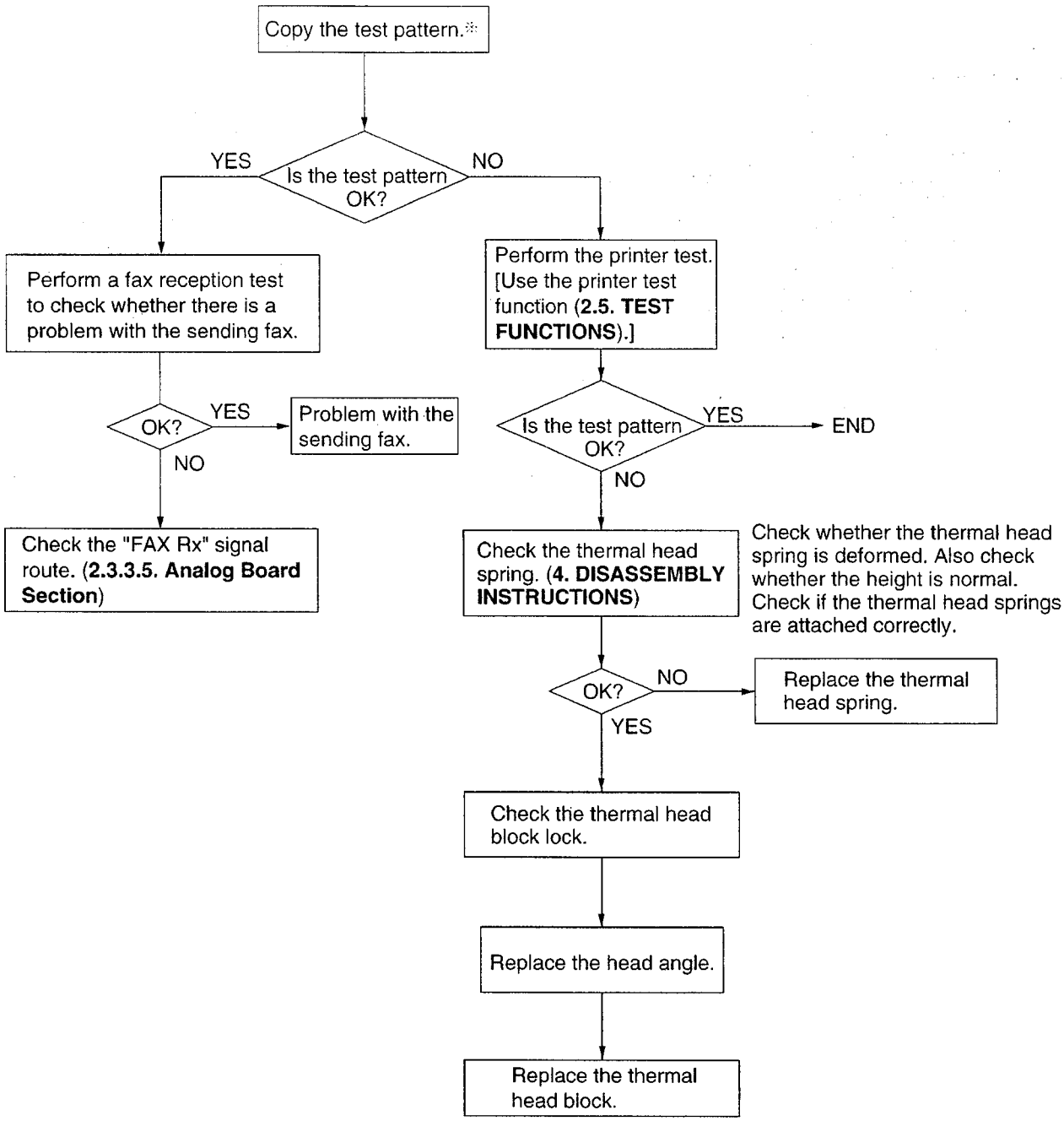

Copy the test pattern.※
Is the test pattern OK?
YES
NO
A problem with the other FAX machine.
Clean the feed route.
Clean the white plate and target glass. (Refer to 1.15.3. MAINTENANCE.) If the dirt cannot be removed, change the white plate.
Is the test pattern OK?
YES
END
NO
Clean the thermal head. (1.15.3. MAINTENANCE)
Is the test pattern OK?
YES
END
NO
Replace the thermal head. (4. DISASSEMBLY INSTRUCTIONS)

14. **Black or white lateral line on print out**



※We recommend making a copy of the Fig. B document in "**3. Multiple feed**" and using it.

15. **An abnormal image is printed.**


Copy the test pattern.※
Is the test pattern OK?
YES
NO
Perform a fax reception test to check whether there is a problem with the sending fax.
Perform the printer test. [Use the printer test function (2.5. TEST FUNCTIONS).]
OK?
YES
Problem with the sending fax.
NO
Check the "FAX Rx" signal route. (2.3.3.5. Analog Board Section)
Is the test pattern OK?
YES
END
NO
Check the thermal head spring. (4. DISASSEMBLY INSTRUCTIONS)
Check whether the thermal head spring is deformed. Also check whether the height is normal. Check if the thermal head springs are attached correctly.
OK?
NO
Replace the thermal head spring.
YES
Check the thermal head block lock.
Replace the head angle.
Replace the thermal head block.

※We recommend making a copy of the Fig. B document in "**3. Multiple feed**" and using it.

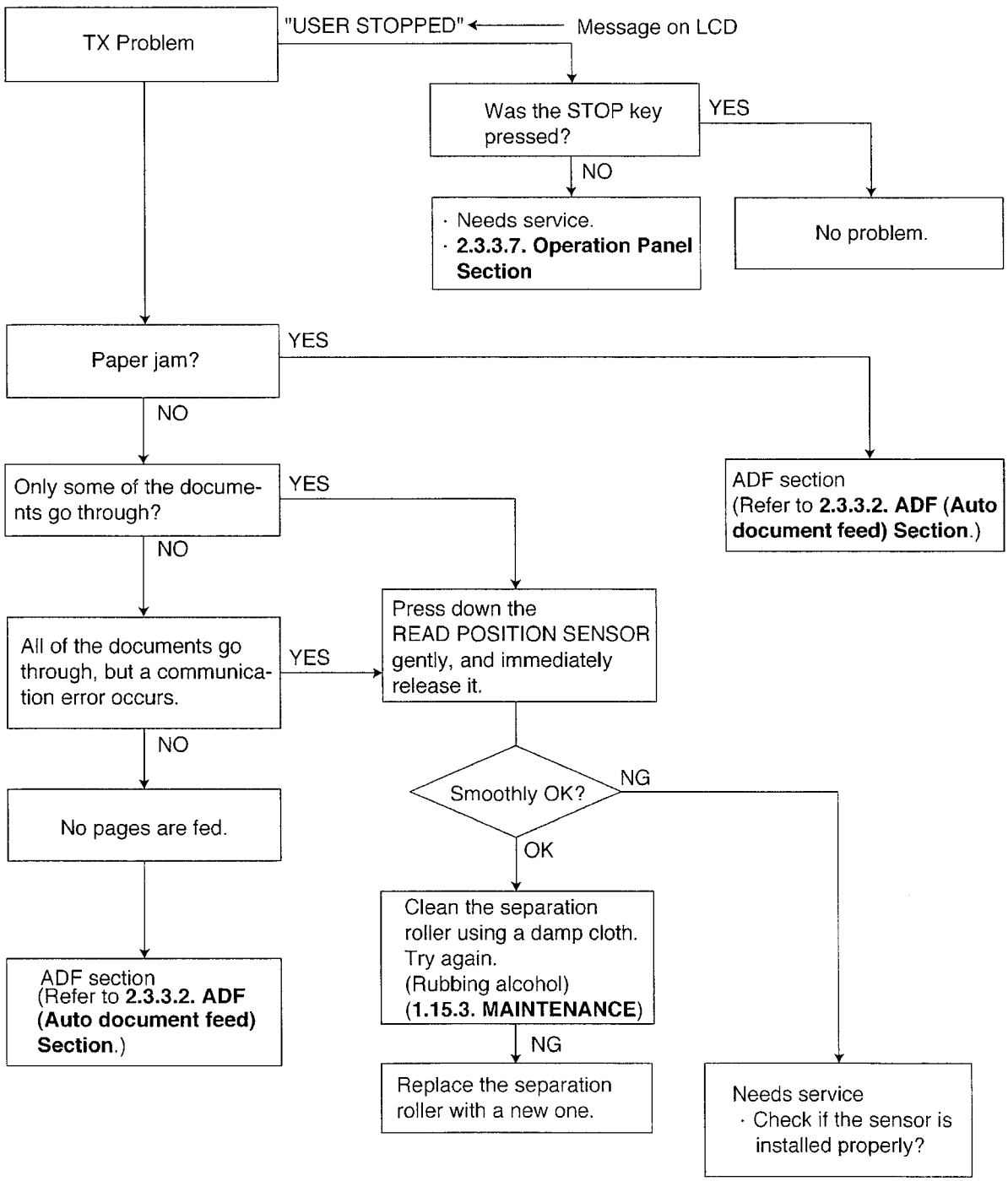
2.3.3.3. Communication Section

Find the problem in the table shown below, and refer to the corresponding troubleshooting procedure in **2.3.3.3.1. Defective facsimile section**.

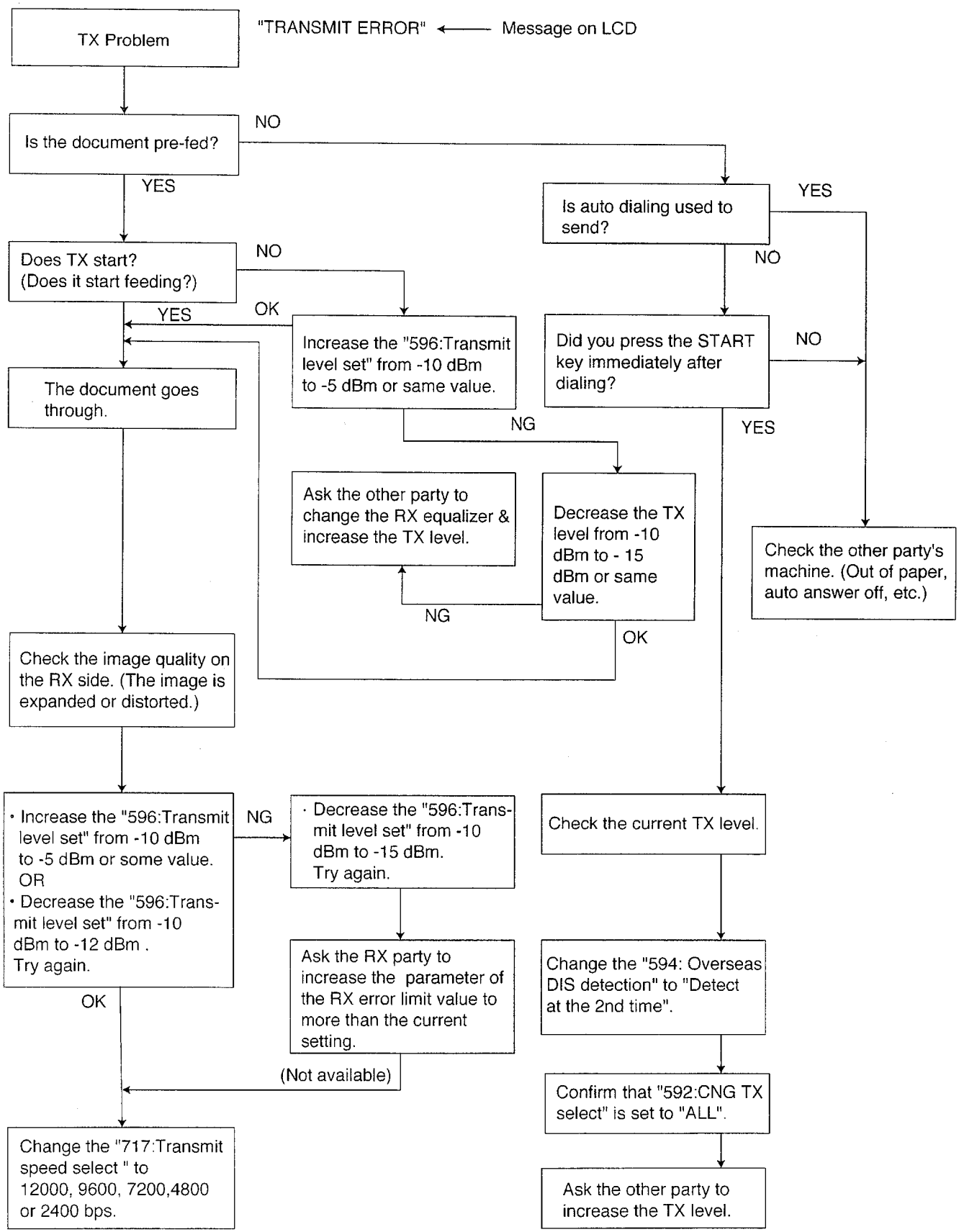
No.	Symptom	Content	Possible cause
1	The paper is not fed properly when faxing. (Nor in the copy mode.)	Troubleshooting	Problem with the feeding mechanism.
2	The fax usually transmits successfully but sometimes fails. (The unit can copy documents.)	Troubleshooting	Problem with the service line or with the receiver's fax.
3	The fax usually receives successfully but sometimes fails. (The unit can copy documents.)	Troubleshooting	Problem with the service line or with the transmitter's fax.
4	The fax completely fails to transmit or receive. (The unit can copy documents.)	Troubleshooting	Problem with the electric circuit.
5	The fax fails either to transmit or receive when making a long distance or an international call. (The unit can copy documents.)	Detailed description of the possible causes (Similar to troubleshooting items No.2 and No.3.)	Problem with the service line.
6	The fax image is poor when transmitting or receiving during a long distance or an international call.		
7	No.1-No.5	The troubleshooting procedure for each error code will be printed on the communication result report.	

2.3.3.3.1. Defective facsimile section

1. **Transmit problem**



2. **Sometimes "TRANSMIT ERROR" occurs.**

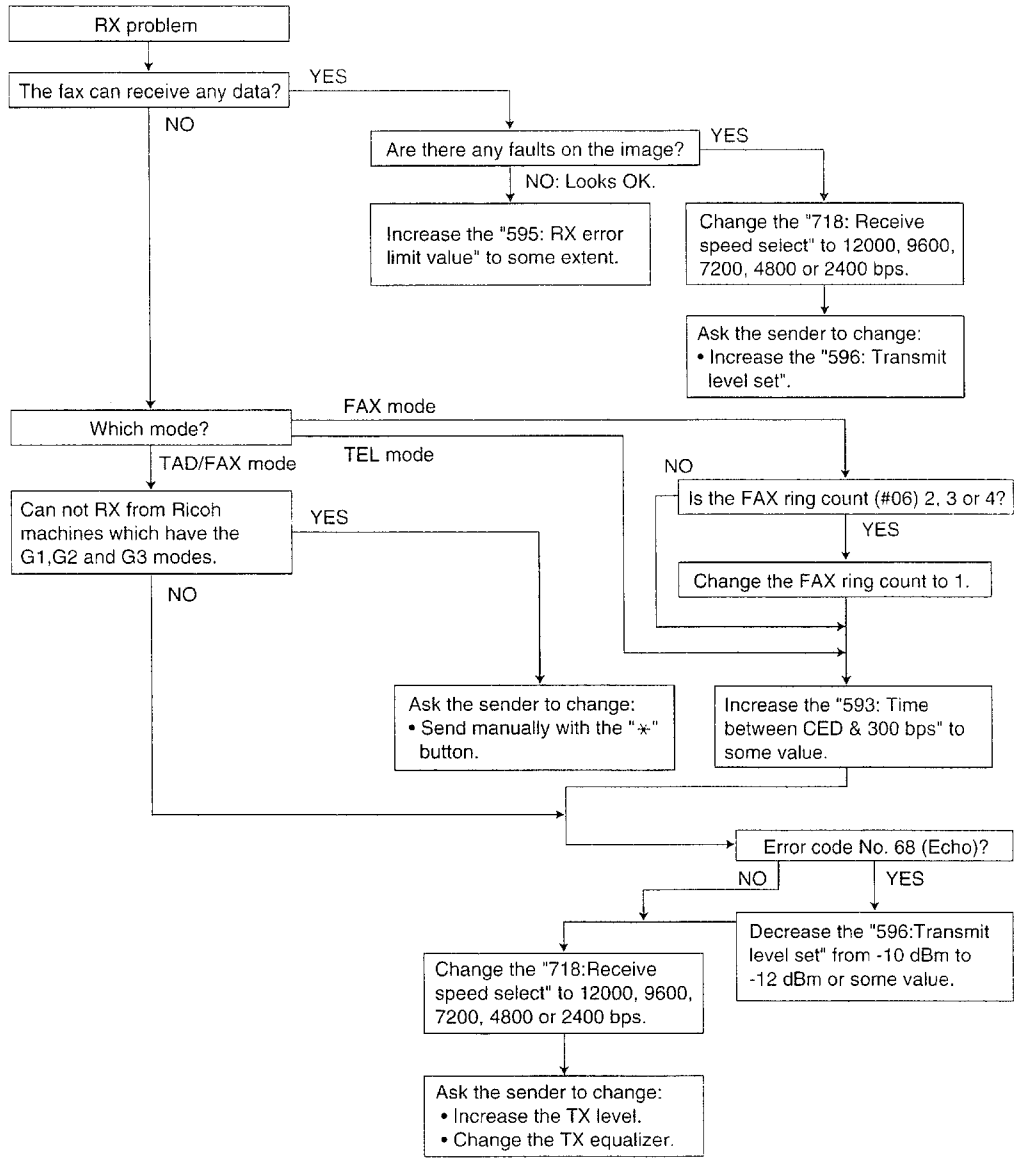

TX Problem
"TRANSMIT ERROR" ← Message on LCD
Is the document pre-fed?
NO
YES
Is auto dialing used to send?
YES
NO
Does TX start? (Does it start feeding?)
NO
YES
OK
Increase the "596:Transmit level set" from -10 dBm to -5 dBm or same value.
Did you press the START key immediately after dialing?
NO
YES
NG
The document goes through.
Ask the other party to change the RX equalizer & increase the TX level.
Decrease the TX level from -10 dBm to - 15 dBm or same value.
Check the other party's machine. (Out of paper, auto answer off, etc.)
NG
OK
Check the image quality on the RX side. (The image is expanded or distorted.)
• Increase the "596:Transmit level set" from -10 dBm to -5 dBm or some value. OR • Decrease the "596:Transmit level set" from -10 dBm to -12 dBm . Try again.
NG
· Decrease the "596:Transmit level set" from -10 dBm to -15 dBm. Try again.
Check the current TX level.
OK
Ask the RX party to increase the parameter of the RX error limit value to more than the current setting.
Change the "594: Overseas DIS detection" to "Detect at the 2nd time".
(Not available)
Confirm that "592:CNG TX select" is set to "ALL".
Change the "717:Transmit speed select " to 12000, 9600, 7200,4800 or 2400 bps.
Ask the other party to increase the TX level.

Note:

"596: Transmit level set" represents a service code. (Refer to **2.4.4. Service Function Table**.)

3. Reception problem

First confirm whether the recording paper is installed properly or not before starting troubleshooting. (Refer to "**Remarks**".)


RX problem
The fax can receive any data?
YES
NO
Are there any faults on the image?
YES
NO: Looks OK.
Increase the "595: RX error limit value" to some extent.
Change the "718: Receive speed select" to 12000, 9600, 7200, 4800 or 2400 bps.
Ask the sender to change:
• Increase the "596: Transmit level set".
Which mode?
FAX mode
TEL mode
TAD/FAX mode
NO
Is the FAX ring count (#06) 2, 3 or 4?
YES
Change the FAX ring count to 1.
Can not RX from Ricoh machines which have the G1,G2 and G3 modes.
YES
NO
Ask the sender to change:
• Send manually with the "✳" button.
Increase the "593: Time between CED & 300 bps" to some value.
Error code No. 68 (Echo)?
NO
YES
Decrease the "596:Transmit level set" from -10 dBm to -12 dBm or some value.
Change the "718:Receive speed select" to 12000, 9600, 7200, 4800 or 2400 bps.
Ask the sender to change:
• Increase the TX level.
• Change the TX equalizer.

Note:

"596: Transmit level set" represents a service code. (Refer to **2.4.4. Service Function Table**.)

Remarks:

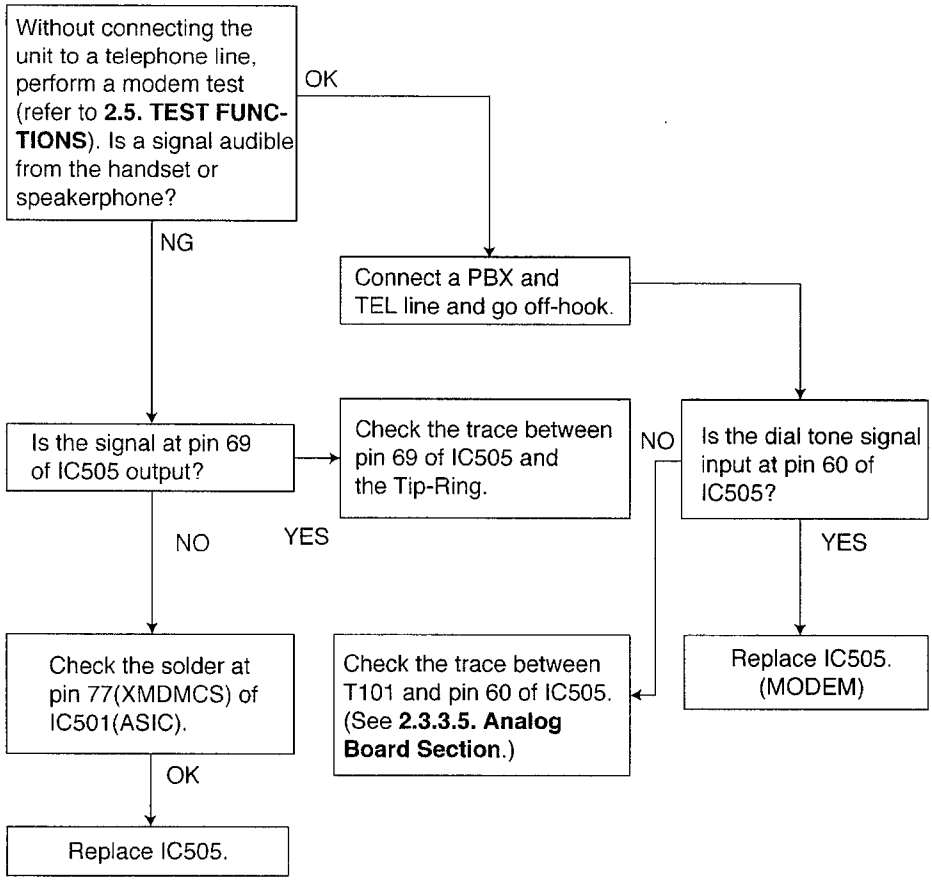
Regarding the reception problem, we have investigated the conceivable causes in the flow chart except for the software-related errors. However, some troubles may occur due to the software-related problems such as "OUT OF PAPER" when the fax switches to the memory receiving mode and the memory capacity becomes full of the unprinted data. In this case, error messages [MEMORY FULL] and its main cause, for example "CHECK PAPER" are displayed on the LCD. Once you solve the main problem, [MEMORY FULL] will be cancelled and the reception problem will be resolved.

LCD display messages indicating the error causes shown below.

CHECK PAPER
CHECK COVER
FILM EMPTY
UNIT OVERHEATED (COVER OPEN, etc.) ...Reset the unit.
PAPER JAMMED
CHECK FILM

Please refer to **2.2. User Recoverable Errors** for the above items. If it turns out to be a hardware deformity, please check each sensor. (Refer to **2.5. TEST FUNCTIONS**.)

4. **The unit can copy, but cannot transmit/receive.**


Without connecting the unit to a telephone line, perform a modem test (refer to **2.5. TEST FUNCTIONS**). Is a signal audible from the handset or speakerphone?
OK
NG
Connect a PBX and TEL line and go off-hook.
Is the signal at pin 69 of IC505 output?
Check the trace between pin 69 of IC505 and the Tip-Ring.
NO
Is the dial tone signal input at pin 60 of IC505?
NO
YES
YES
Check the solder at pin 77(XMDMCS) of IC501(ASIC).
Check the trace between T101 and pin 60 of IC505. (See **2.3.3.5. Analog Board Section**.)
Replace IC505. (MODEM)
OK
Replace IC505.

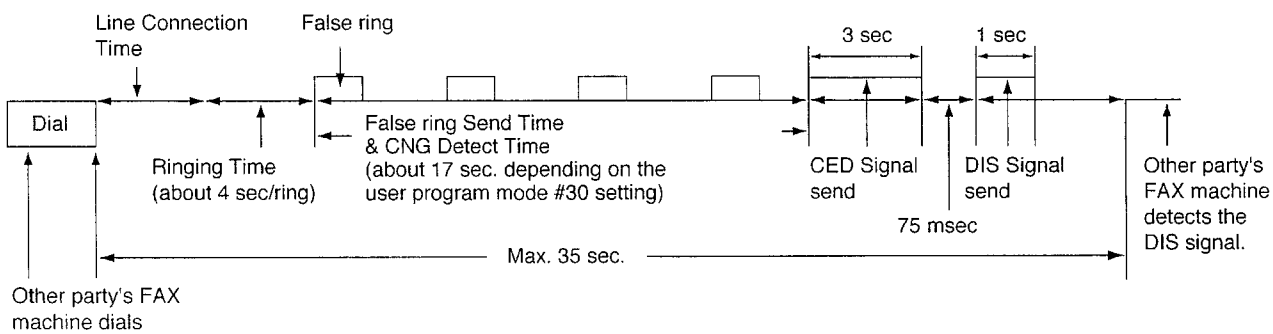
5. **The unit can copy, but cannot either transmit/receive long distance or international communications.**

The following two causes are conceivable regarding this symptom.

Cause 1:

The other party is executing automatic dialing, the call has been received by this unit, and the CED or DIS signal response time is too long. (In most cases, this unit detects the CNG signal and can respond to CED or DIS.) (According to the ITU-T standard, the communication procedure is cancelled when there is no response from the other party within 35 sec, so that the other party releases the line.)

(Response Time)


Line Connection Time
False ring
3 sec
1 sec
Dial
False ring Send Time & CNG Detect Time (about 17 sec. depending on the user program mode #30 setting)
Ringing Time (about 4 sec/ring)
CED Signal send
DIS Signal send
75 msec
Other party's FAX machine detects the DIS signal.
Max. 35 sec.
Other party's FAX machine dials

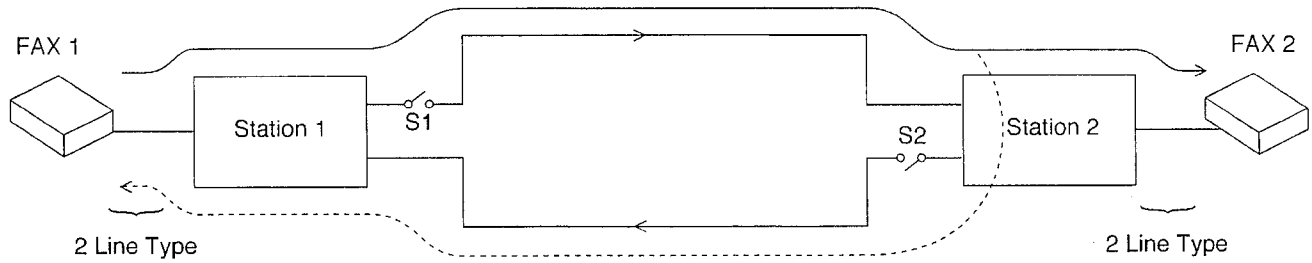
(Cause and Countermeasure)

As shown in the chart above, the total handshaking time must be reduced, but because of the long distance connection and linking of several stations, the line connection time cannot be reduced. Accordingly, the following countermeasures should be tried.

(A)... As the 35 sec. count is started directly after dialing or directly after the START button has been pressed for models with a START button, the other party should be called manually, if possible. Another possibility is entering two pauses at the end of the auto dial number on the transmission side. Then the count start time can be delayed for 2 pauses (about 10 sec.).

Cause 2:

Erroneous detection because of an echo or an echo canceler.



The sea bottom cable or satellite communication path (4 Line Type)

(Echo/Echo Canceler)

The signal from FAX1 reaches FAX2 via stations 1 and 2, but the reflection signal at station 2 also returns via station 1 (echo). As the distance between station 1 and station 2 is far, the echo returns to FAX 1 at a max of 600 msec after transmission. There is a possibility that this signal is detected erroneously as the signal from FAX2. For a normal call, there is also a possibility that the echo of their own voice will make the call difficult to understand. For this reason, each station (station 1 and station 2) attaches echo cancelers (S1 and S2) for international lines or long distance lines. For the echo canceler, the level of the transmission signal from FAX 1 is compared with the level of the reception signal from FAX2. When the transmission signal is larger, S1 is closed while S2 is opened when it is smaller. In other words, for transmission from FAX1, S1 is closed and S2 is open, so that the echo does not return to FAX1.

(Causes and Countermeasures)

(Cause A)

When a training signal is transmitted from FAX1 during the communication procedure at the time of transmission from FAX1 to FAX2, there is a delay until the echo canceler operates. S1 is closed so that a part of the head of the training signal may drop out. Normal reception by FAX2 may not be possible, and transmission may not be started.

(Countermeasure A)

When the international line mode is ON in the service mode (code No. 521), a dummy signal is attached to the head of the training signal to prevent this problem. As this is normally ON, it is necessary to reconfirm that this has not become OFF. When the international mode is switched OFF, the transmission side will try the training signal three times at each speed (9600BPS, 4800BPS and 2400BPS). If NG, it will drop the speed by one rank (fall-back). When the international mode is switched ON, each speed will be tried only twice. In other words, the slower speed with fewer errors can be accessed more easily. This is done because the line conditions may deteriorate and the picture may be disturbed more easily during communication for international lines or long distance communication, even when the training is OK. The default value is ON as preference is given to clearer pictures rather than speed.

(Cause B)

The echo canceler operation stops with a 2100Hz signal. (i.e. S1 and S2 become ON). Accordingly, when FAX1 has executed automatic reception, a CED signal is output. If this signal is 2100Hz, S1 and S2 will become ON. Then the echo of the DIS signal output afterwards may be received and FAX1 may execute an erroneous operation, preventing communication from starting.

(Countermeasure B)

In the service mode, the CED signal frequency is set to 1100 Hz (code No.520), or the time setting between the CED signal and the DIS signal is set from 75 msec to 500 msec in the service mode (code No.593). This is because the echo canceler operation stop mode is canceled by an interval of 250 msec or more.
Reduce receiving sensitivity to reduce the effect of RCV echo signal. (Service mode: code No. 598)

(Cause C)

This model is FAX1 and the other party is FAX2.

For transmission from this model to FAX2, FAX2 executes automatic reception and transmits a CED signal (2100 Hz) followed by a DIS signal. As the echo cancelers stops as described in cause B, the echo of the DIS signal returns to FAX2. On the other hand, this model detects the DIS signal and transmits a DCS signal. In other words, it is possible that the echo of the DIS signal and the DCS signal transmitted from this model reach FAX2 one after the other. FAX2 detects an error and communication does not start.

(Countermeasure C)

When the international DIS detection setting is set in the service mode (code No.594), this model does not respond to the first DIS signal and returns a DCS signal only for the second DIS signal.

In other words, there is an interval of 250 msec between transmission of the first and second DIS signal so that the echo cancelers operation recovers. An echo is not generated for the second DIS signal.

Note:

When the other FAX does not respond with a DCS signal after DIS signal transmission, the DIS signal is transmitted three times for trial.

Summary:

Symptom/Countermeasure Table (Long distance and international communication operations)

SYMPTOM	COUNTERMEASURE
Does not receive in the automatic mode.	a. If possible, manual transmission should be done from the transmission side. b. If possible, two pauses should be inserted at the end of the auto dial number on the transmission side. c. If possible, the Function Selector Switch should be switched to FAX.
Does not transmit.	a. Confirm the international line mode is ON. (Service mode: code No. 521) b. Set the international DIS detection. (Service mode: code No. 594)
Does not receive.	a. Set the time between the CED signal and the DIS signal to 500 msec. (Service mode: code No. 593) b. Set the CED frequency to 1100Hz. (Service mode: code No. 520)

6. **The unit can copy, but the transmission and reception image are incorrect.**

(Long distance or international communication operation)

This symptom highly depends on the transmission and reception capability of the other FAX unit and the line conditions.

The countermeasures for this unit are shown below.

Transmission Operation:

Set the transmitting speed to 4800BPS (service mode: code No. 717) or select the overseas mode.

Reception Operation:

If 80% or more of the reception is incorrect, set the receiving speed to 4800BPS. (Service mode: code No. 718)

· Refer to **2.4.4. SERVICE FUNCTION TABLE**.

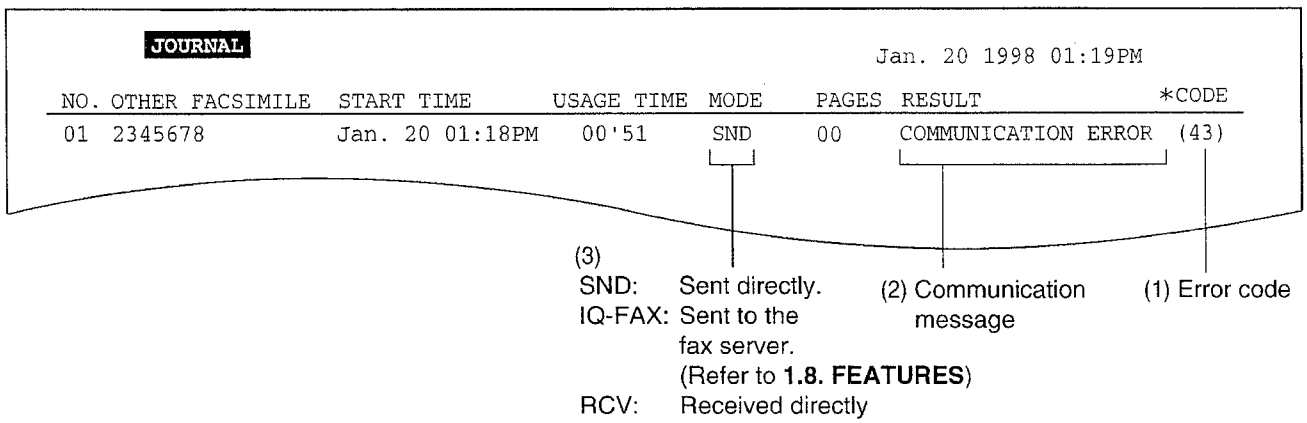
7. **How to output the Journal Report:**

a. Press the MENU button.

b. Press "#", then " 8 " and " 4 ".

c. Press the START/COPY/SET button.

d. The report prints out.


JOURNAL
Jan. 20 1998 01:19PM
NO. OTHER FACSIMILE START TIME USAGE TIME MODE PAGES RESULT *CODE
01 2345678 Jan. 20 01:18PM 00'51 SND 00 COMMUNICATION ERROR (43)
(3)
SND: Sent directly.
IQ-FAX: Sent to the fax server.
(Refer to 1.8. FEATURES)
RCV: Received directly
(2) Communication message
(1) Error code

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Error code table:

(1) CODE	(2) RESULT	(3) MODE	SYMPTOM	Counter-measure*
	PRESSED THE STOP KEY	TX & RX	Communication was interrupted by the STOP button.	
	DOCUMENT JAMMED	TX	The document paper is jammed.	
	NO DOCUMENT	TX	No document paper.	
	THE COVER WAS OPENED	TX & RX	The cover is open.	
40	NO RESPONSE	TX	Transmission is finished when the T1 TIMER expires.	1
41	COMMUNICATION ERROR	TX	DCN is received after DCS transmission.	2
42	COMMUNICATION ERROR	TX	FTT is received after transmission of a 2400BSP training signal.	3
43	COMMUNICATION ERROR	TX	No response after post message is transmitted three times.	4
44	COMMUNICATION ERROR	TX	RTN and PIN are received.	5
46	COMMUNICATION ERROR	RX	No response after FTT is transmitted.	6
48	COMMUNICATION ERROR	RX	No post message.	7
49	COMMUNICATION ERROR	RX	RTN is transmitted.	8
50	COMMUNICATION ERROR	RX	PIN is transmitted (to PRI-Q).	8
51	COMMUNICATION ERROR	RX	PIN is transmitted.	8
52	NO RESPONSE	RX	Reception is finished when the T1 TIMER expires.	9
54	ERROR-NOT YOUR UNIT	RX	DCN is received after DIS transmission.	11
58	COMMUNICATION ERROR	RX	DCN is received after FTT transmission.	13
59	ERROR-NOT YOUR UNIT	TX	DCN responds to the post message.	14
65	COMMUNICATION ERROR	TX	DCN is received before DIS reception.	2
65	COMMUNICATION ERROR	RX	Reception is not EOP, EOM PIP, PIN, RTP or RTN.	2
68	COMMUNICATION ERROR	RX	No response at the other party after MCF or CFR is transmitted.	13
70	ERROR-NOT YOUR UNIT	RX	DCN is received after CFR transmission.	13
72	COMMUNICATION ERROR	RX	Carrier is cut when the image signal is received.	16
75	MEMORY FULL	RX	The document was not received due to memory full.	
79	CANCELED	TX	The multistation transmission was rejected by the user.	
FF	COMMUNICATION ERROR	TX & RX	Modem error. For the DCN, DCN, etc. abbreviations, refer to **6.6. MODEM SECTION**.	12

TX=TRANSMISSION RX=RECEPTION

Most fax communication problems can be resolved by the following steps.

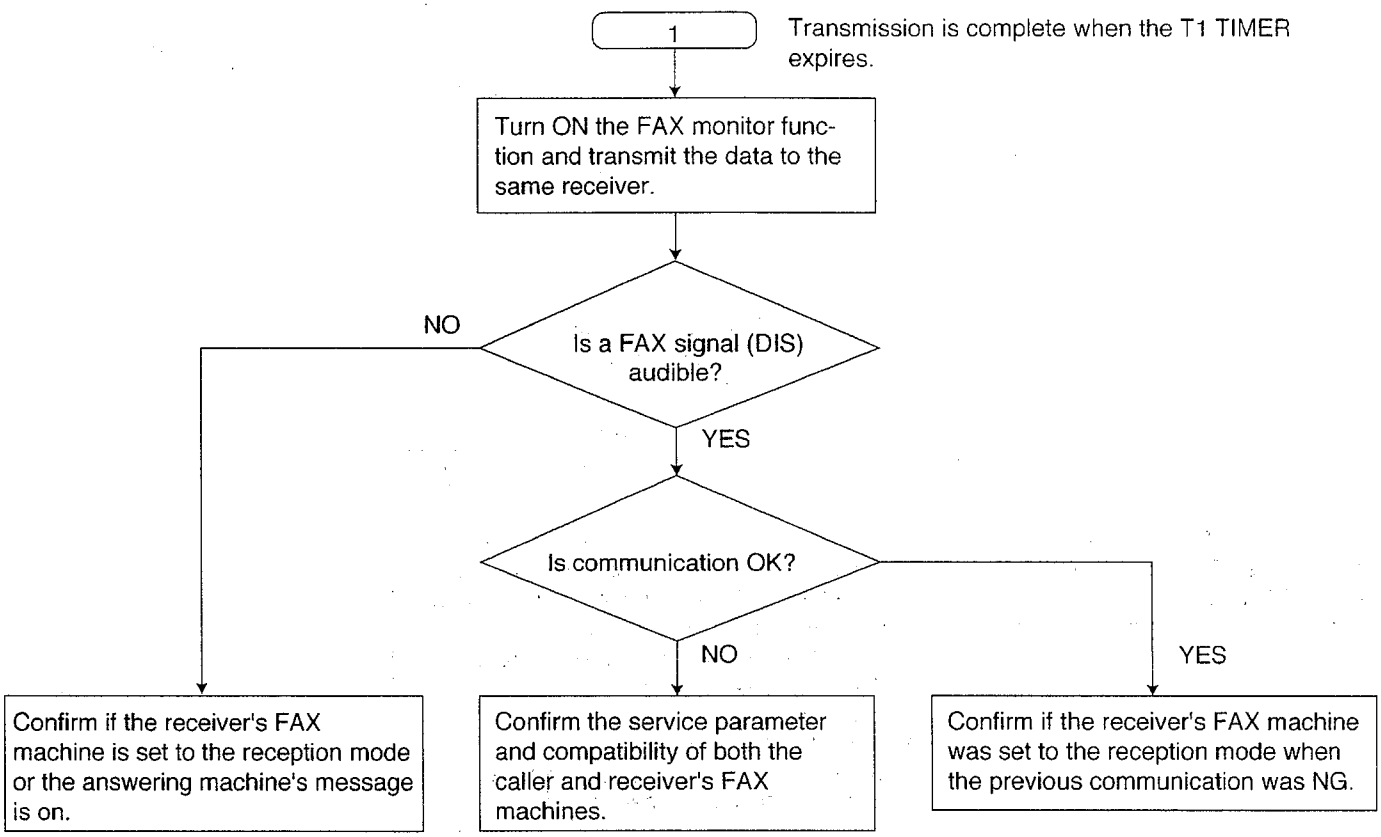
a. Change the transmit level. (Service code: 596, refer to **2.4.4. SERVICE FUNCTION TABLE**.)

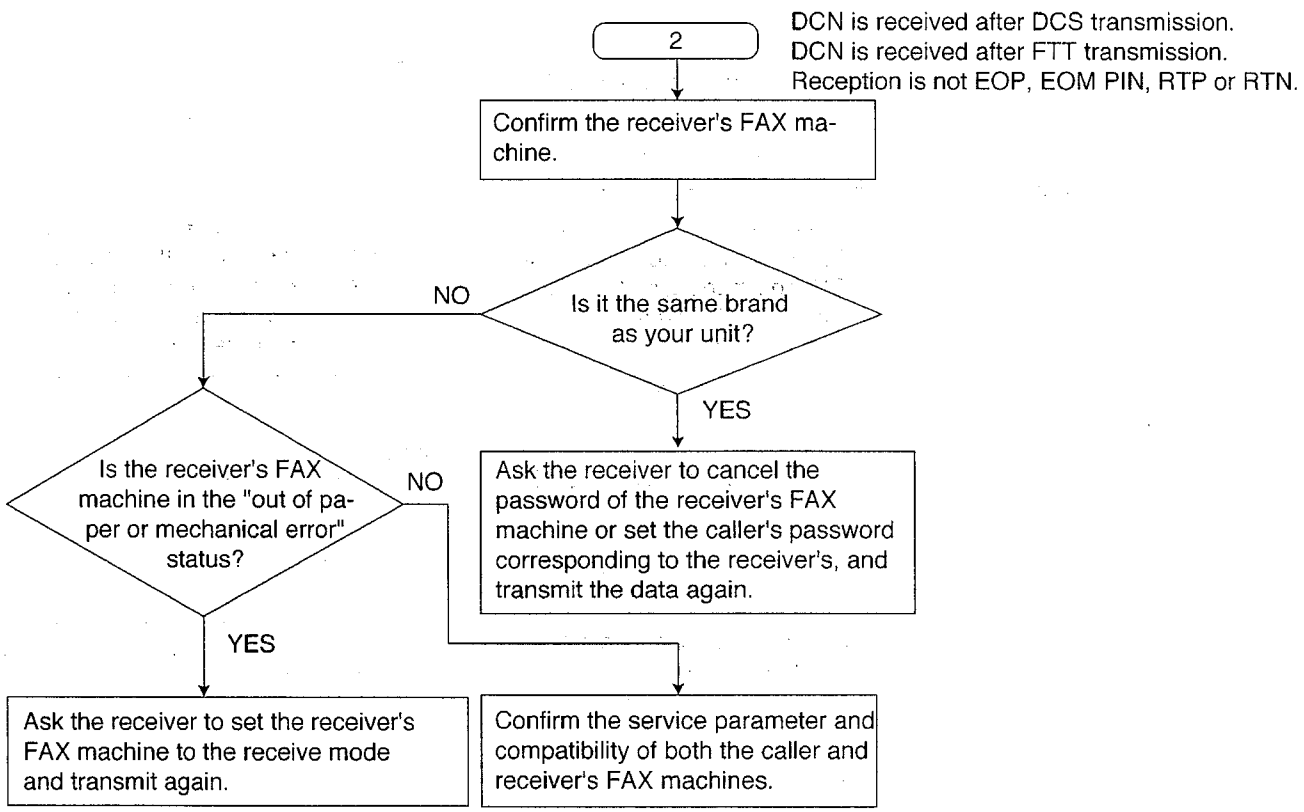
b. Change the TX speed/RX speed. (Service code: 717/718, refer to **2.4.4. SERVICE FUNCTION TABLE**.)

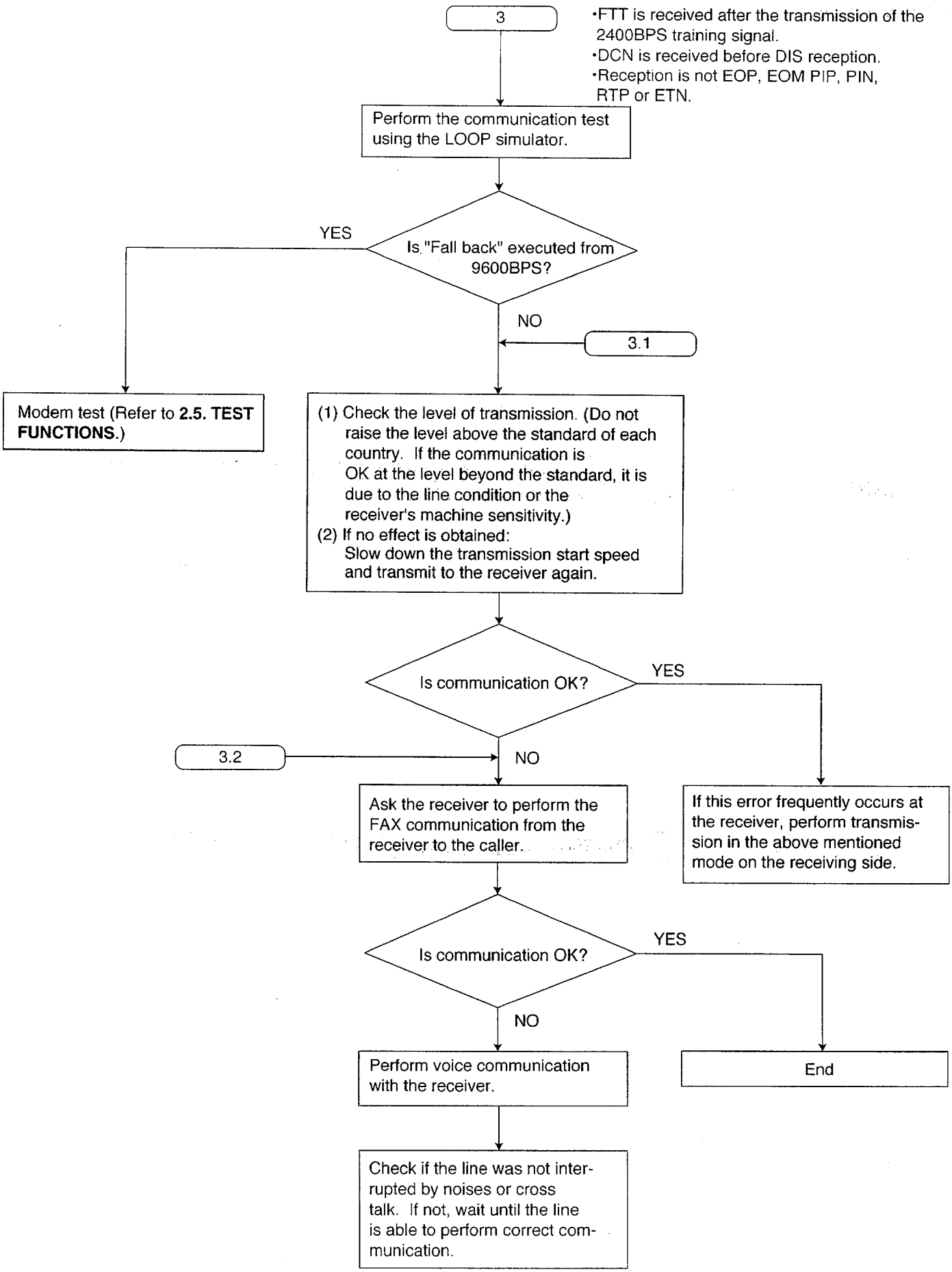
Note*:

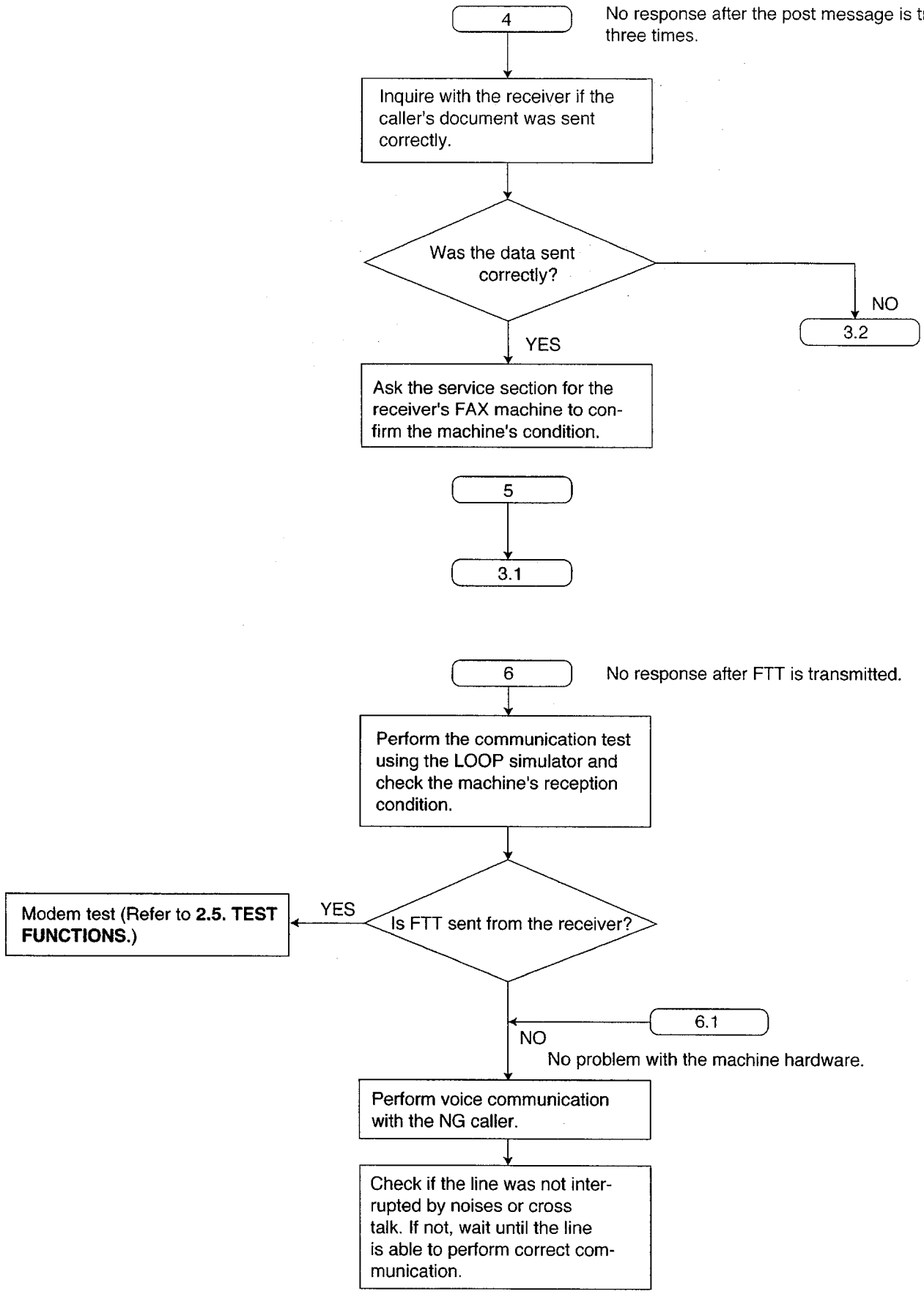
If the problem remains, see the "**Countermeasure**" flow chart.

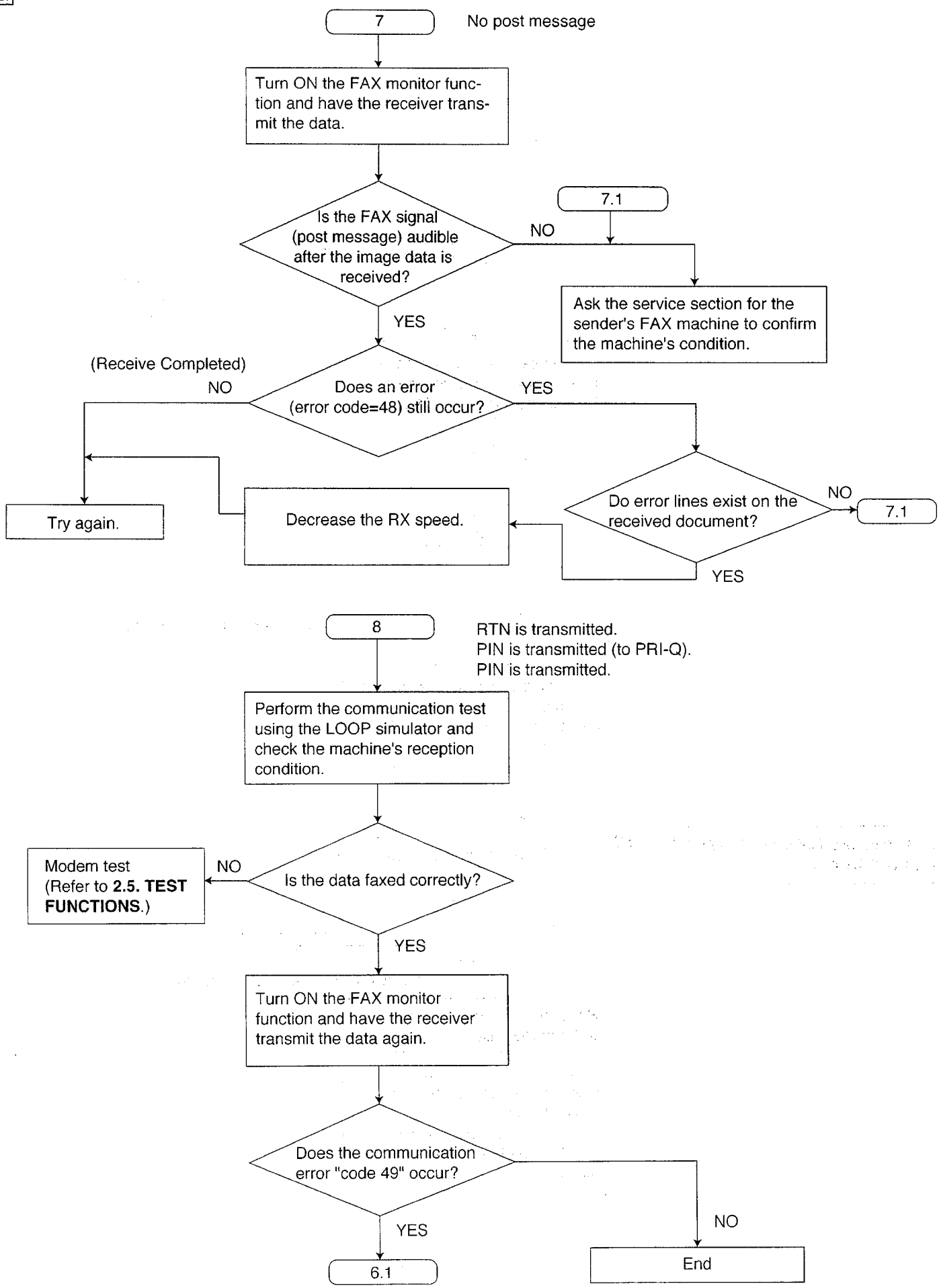
Countermeasure

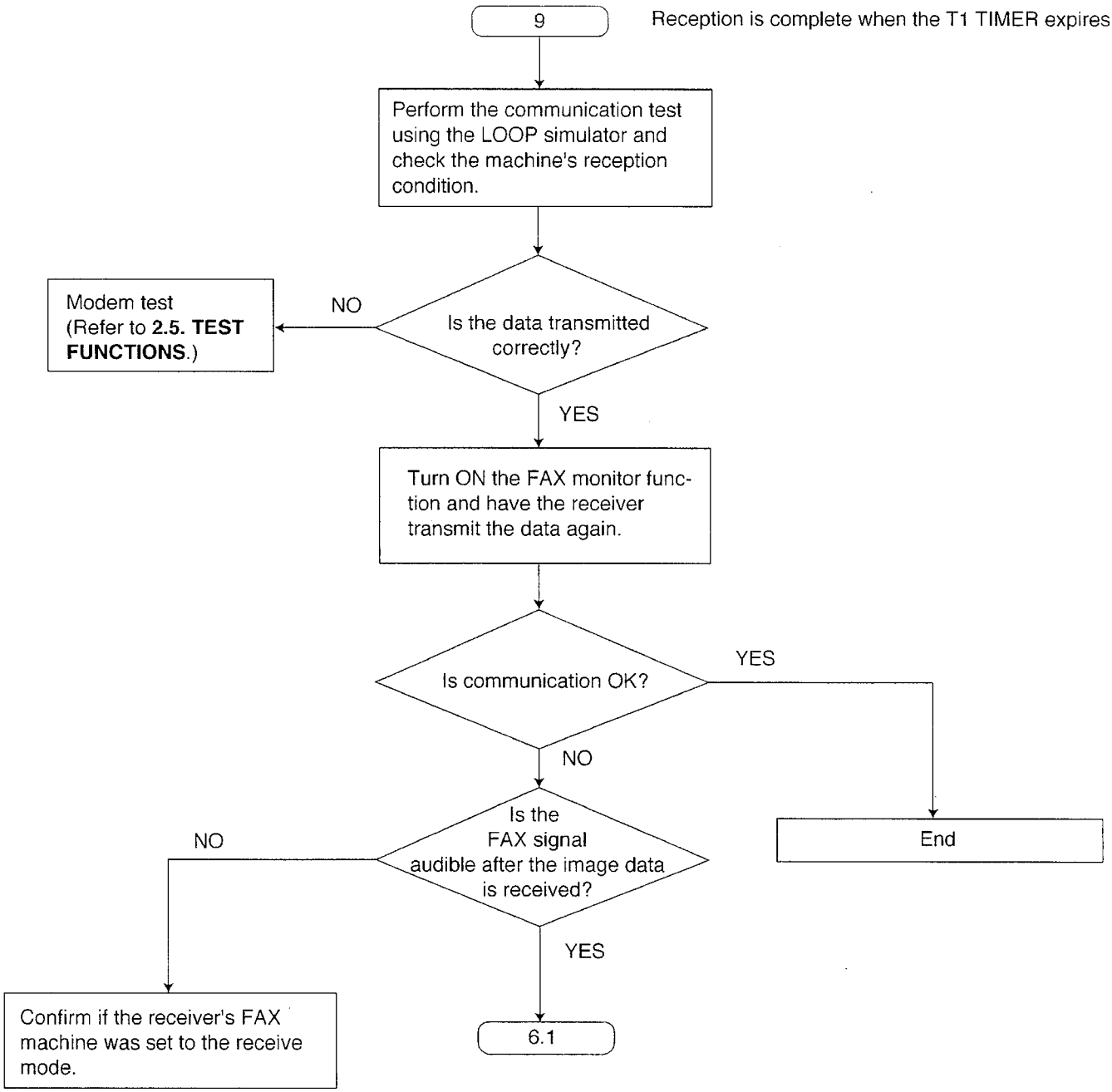

1
Transmission is complete when the T1 TIMER expires.
Turn ON the FAX monitor function and transmit the data to the same receiver.
Is a FAX signal (DIS) audible?
NO
YES
Is communication OK?
NO
YES
Confirm if the receiver's FAX machine is set to the reception mode or the answering machine's message is on.
Confirm the service parameter and compatibility of both the caller and receiver's FAX machines.
Confirm if the receiver's FAX machine was set to the reception mode when the previous communication was NG.

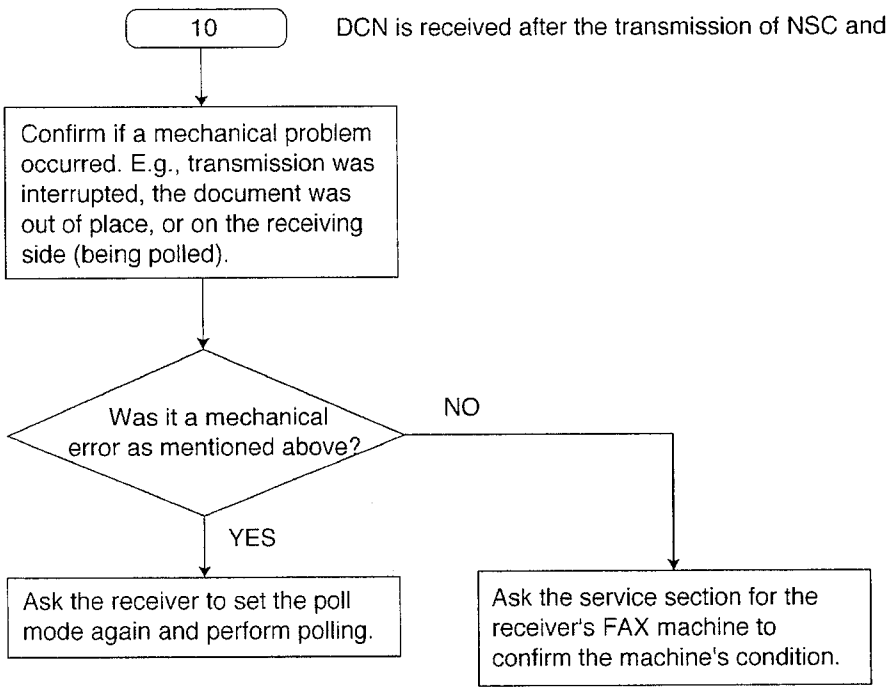

2
DCN is received after DCS transmission.
DCN is received after FTT transmission.
Reception is not EOP, EOM PIN, RTP or RTN.
Confirm the receiver's FAX machine.
Is it the same brand as your unit?
NO
YES
Is the receiver's FAX machine in the "out of paper or mechanical error" status?
NO
YES
Ask the receiver to cancel the password of the receiver's FAX machine or set the caller's password corresponding to the receiver's, and transmit the data again.
Ask the receiver to set the receiver's FAX machine to the receive mode and transmit again.
Confirm the service parameter and compatibility of both the caller and receiver's FAX machines.

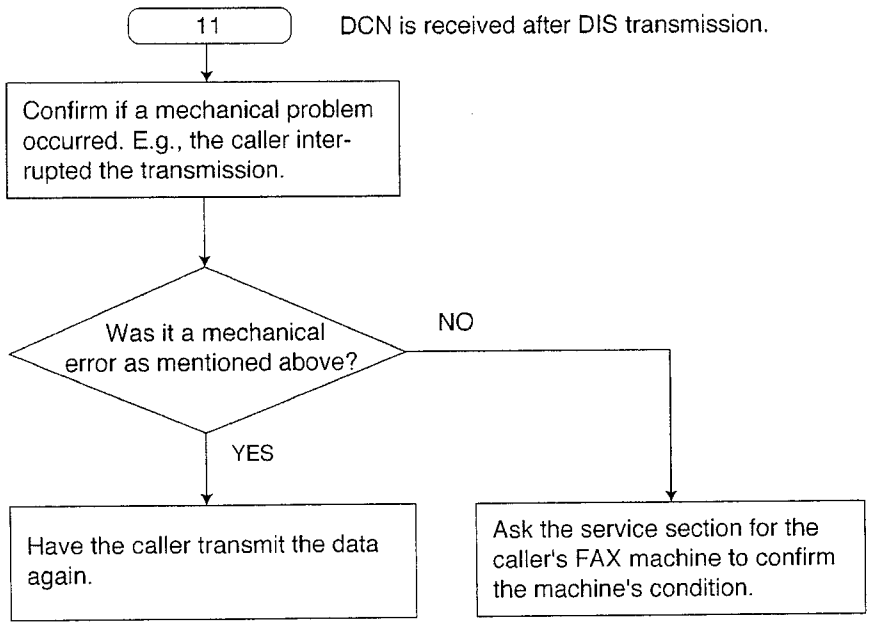

3
•FTT is received after the transmission of the 2400BPS training signal.
•DCN is received before DIS reception.
•Reception is not EOP, EOM PIP, PIN, RTP or ETN.
Perform the communication test using the LOOP simulator.
Is "Fall back" executed from 9600BPS?
YES
NO
3.1
Modem test (Refer to **2.5. TEST FUNCTIONS.**)
(1) Check the level of transmission. (Do not raise the level above the standard of each country. If the communication is OK at the level beyond the standard, it is due to the line condition or the receiver's machine sensitivity.)
(2) If no effect is obtained:
Slow down the transmission start speed and transmit to the receiver again.
Is communication OK?
YES
3.2
NO
Ask the receiver to perform the FAX communication from the receiver to the caller.
If this error frequently occurs at the receiver, perform transmission in the above mentioned mode on the receiving side.
Is communication OK?
YES
NO
Perform voice communication with the receiver.
End
Check if the line was not interrupted by noises or cross talk. If not, wait until the line is able to perform correct communication.

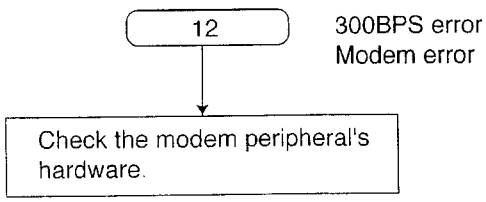

4
No response after the post message is transmitted three times.
Inquire with the receiver if the caller's document was sent correctly.
Was the data sent correctly?
NO
3.2
YES
Ask the service section for the receiver's FAX machine to confirm the machine's condition.
5
3.1
6
No response after FTT is transmitted.
Perform the communication test using the LOOP simulator and check the machine's reception condition.
Modem test (Refer to **2.5. TEST FUNCTIONS.**)
YES
Is FTT sent from the receiver?
6.1
NO
No problem with the machine hardware.
Perform voice communication with the NG caller.
Check if the line was not interrupted by noises or cross talk. If not, wait until the line is able to perform correct communication.

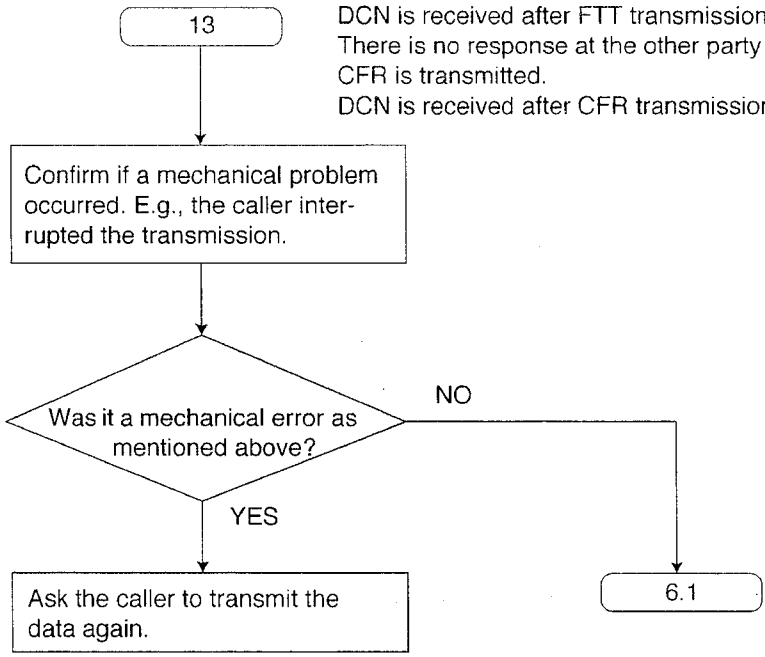

7
No post message
Turn ON the FAX monitor function and have the receiver transmit the data.
Is the FAX signal (post message) audible after the image data is received?
NO
7.1
Ask the service section for the sender's FAX machine to confirm the machine's condition.
YES
(Receive Completed)
NO
Does an error (error code=48) still occur?
YES
Try again.
Decrease the RX speed.
Do error lines exist on the received document?
NO
7.1
YES
8
RTN is transmitted.
PIN is transmitted (to PRI-Q).
PIN is transmitted.
Perform the communication test using the LOOP simulator and check the machine's reception condition.
Modem test (Refer to **2.5. TEST FUNCTIONS**.)
NO
Is the data faxed correctly?
YES
Turn ON the FAX monitor function and have the receiver transmit the data again.
Does the communication error "code 49" occur?
YES
NO
6.1
End

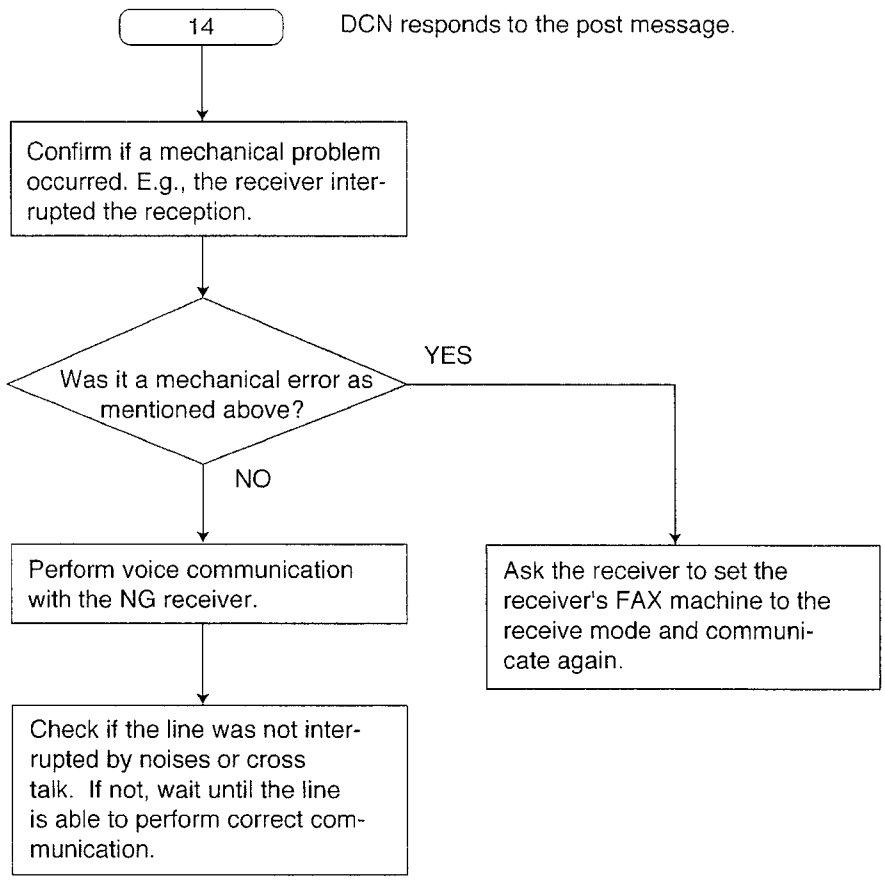

9
Reception is complete when the T1 TIMER expires.
Perform the communication test using the LOOP simulator and check the machine's reception condition.
Is the data transmitted correctly?
NO
Modem test (Refer to **2.5. TEST FUNCTIONS**.)
YES
Turn ON the FAX monitor function and have the receiver transmit the data again.
Is communication OK?
YES
End
NO
Is the FAX signal audible after the image data is received?
NO
Confirm if the receiver's FAX machine was set to the receive mode.
YES
6.1

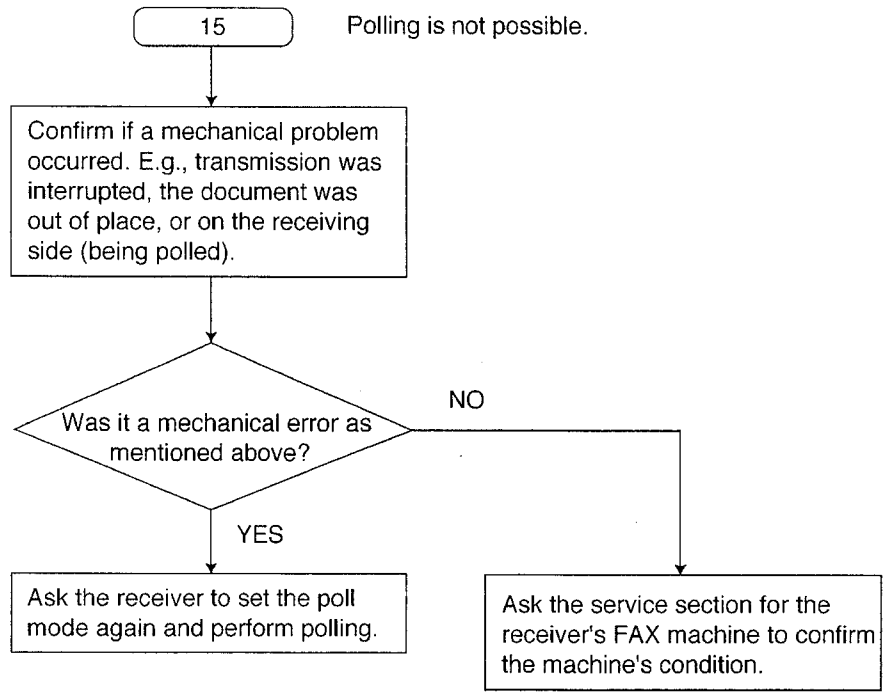

10
DCN is received after the transmission of NSC and DTC.
Confirm if a mechanical problem occurred. E.g., transmission was interrupted, the document was out of place, or on the receiving side (being polled).
Was it a mechanical error as mentioned above?
NO
YES
Ask the receiver to set the poll mode again and perform polling.
Ask the service section for the receiver's FAX machine to confirm the machine's condition.

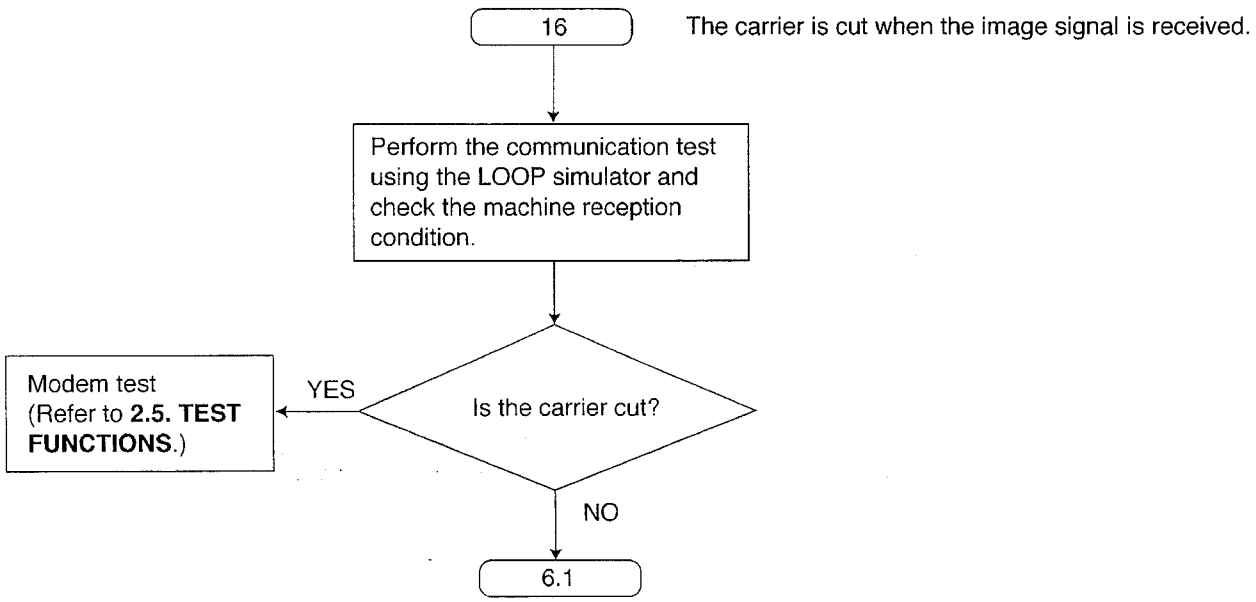

11
DCN is received after DIS transmission.
Confirm if a mechanical problem occurred. E.g., the caller interrupted the transmission.
Was it a mechanical error as mentioned above?
NO
YES
Have the caller transmit the data again.
Ask the service section for the caller's FAX machine to confirm the machine's condition.


12
300BPS error
Modem error
Check the modem peripheral's hardware.


13
DCN is received after FTT transmission.
There is no response at the other party after MCF or CFR is transmitted.
DCN is received after CFR transmission.
Confirm if a mechanical problem occurred. E.g., the caller interrupted the transmission.
Was it a mechanical error as mentioned above?
NO
YES
Ask the caller to transmit the data again.
6.1


14
DCN responds to the post message.
Confirm if a mechanical problem occurred. E.g., the receiver interrupted the reception.
Was it a mechanical error as mentioned above?
YES
NO
Perform voice communication with the NG receiver.
Ask the receiver to set the receiver's FAX machine to the receive mode and communicate again.
Check if the line was not interrupted by noises or cross talk. If not, wait until the line is able to perform correct communication.


15
Polling is not possible.
Confirm if a mechanical problem occurred. E.g., transmission was interrupted, the document was out of place, or on the receiving side (being polled).
Was it a mechanical error as mentioned above?
NO
YES
Ask the receiver to set the poll mode again and perform polling.
Ask the service section for the receiver's FAX machine to confirm the machine's condition.


16
The carrier is cut when the image signal is received.
Perform the communication test using the LOOP simulator and check the machine reception condition.
Is the carrier cut?
YES
Modem test (Refer to **2.5. TEST FUNCTIONS**.)
NO
6.1

2.3.3.3.2. Remote programming

If, after the call is connected, the customer describes the situation and it is determined that the problem can be corrected by making parameter changes, this function makes it possible to change parameters such as the user code and service code from another fax (using DTMF tones). Therefore, travel to the customer's location is not required. However, it is not possible to change all the parameters remotely (**2. Program mode table**). The function used to accomplish this is remote programming.

First, in order to check the current status of the service code parameter, print out the setup list (code: 991) and the service list (code: 999) from the customer's fax machine.

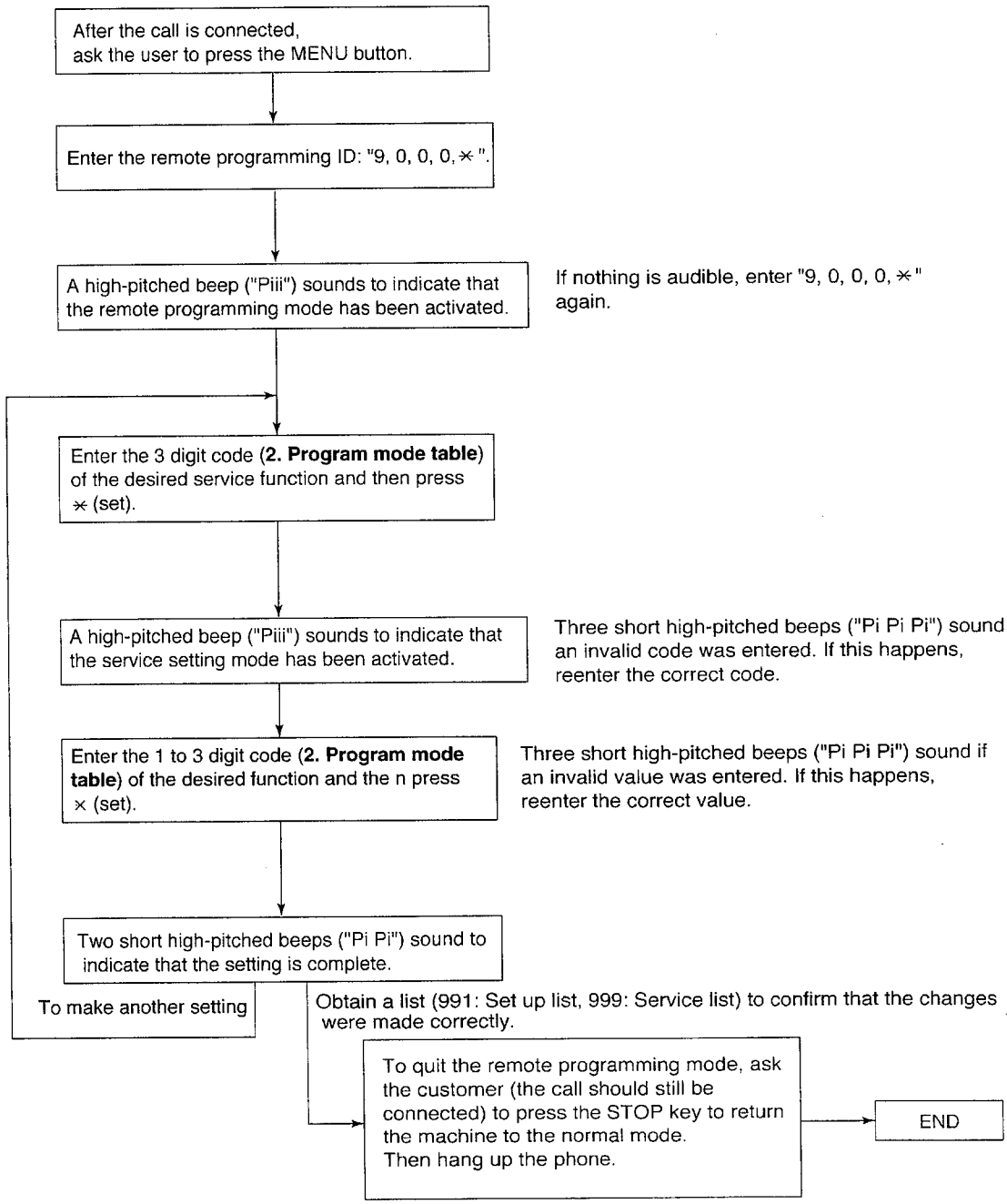
Based on these lists, the parameters for the desired codes can be changed.

The procedure for changing and listing parameters is described on **1. Entering the remote programming mode and changing service codes**. Also, before you quit the remote programming mode, it is advisable to obtain a new list to confirm that the changes were made correctly.

Hint:

Since the connected telephone is in use during the remote programming mode, it may be helpful to ask the customer to switch to the speakerphone. This frees the customer from the need to remain right next to the fax while you are making parameter settings. When finished, inform the customer. Also note that in very noisy locations where the DTMF tones are not audible, the remote programming function will not work.

1. **Entering the remote programming mode and changing service codes**


After the call is connected, ask the user to press the MENU button.
Enter the remote programming ID: "9, 0, 0, 0, ✳".
A high-pitched beep ("Piii") sounds to indicate that the remote programming mode has been activated.
If nothing is audible, enter "9, 0, 0, 0, ✳" again.
Enter the 3 digit code (2. Program mode table) of the desired service function and then press ✳ (set).
A high-pitched beep ("Piii") sounds to indicate that the service setting mode has been activated.
Three short high-pitched beeps ("Pi Pi Pi") sound if an invalid code was entered. If this happens, reenter the correct code.
Enter the 1 to 3 digit code (2. Program mode table) of the desired function and the n press × (set).
Three short high-pitched beeps ("Pi Pi Pi") sound if an invalid value was entered. If this happens, reenter the correct value.
Two short high-pitched beeps ("Pi Pi") sound to indicate that the setting is complete.
To make another setting
Obtain a list (991: Set up list, 999: Service list) to confirm that the changes were made correctly.
To quit the remote programming mode, ask the customer (the call should still be connected) to press the STOP key to return the machine to the normal mode. Then hang up the phone.
END

2. Program Mode Table

Code	Function	Set Value	Default	Remote Setting
001	Set date and time	mm/dd/yy hh:mm	Jan/01/98	NG
002	Your logo	---------	None	NG
003	Your telephone number	---------	None	NG
004	Transmission report mode	1:Error / 2:ON / 3:OFF	Error	OK
006	FAX ring count	1~4	2	OK
	TAD/FAX ring count	1~4/TOLL SAVER/RINGER OFF	2	OK
	Not available in TEL/FAX mode	---------	---------	OK
010	Recording time	1:VOX/2:MIN	VOX	OK
011	Remote ANS ID	---------	ID=111	NG
013	Dialing mode	1:Pulse / 2:Tone / 3:Auto	Auto	OK
022	Auto journal print	1:ON / 2:OFF	ON	OK
023	Overseas mode	ON / OFF	OFF	OK
025	Delayed transmission	ON / OFF	OFF	NG
026	Auto caller list	1:ON / 2:OFF	ON	OK
030	Silent FAX recognition ring	3 to 6 rings	3	OK
031	Distinctive ring	1:OFF / 2:A / 3:B / 4:C / 5:D	OFF	OK
036	Rx reduction	1:92% / 2:86% / 3:72% / 4:OFF	92%	OK
039	LCD contrast	1:Normal / 2:Darker	Normal	NG
041	Remote FAX activation code	ON / OFF	ON ID=*9	NG
042	Message alert	1:ON / 2:OFF	OFF	OK
043	REC. time alert	1:ON / 2:OFF	OFF	OK
044	Receive alert	1:ON / 2:OFF	ON	OK
046	Friendly receive	1:ON / 2:OFF	ON	OK
047	FAX voice guidance	1:ERROR/2:ON/3:OFF	ON	OK
054	Common greeting MSG. REC. time	1:16s/2:60s	16s	OK
060	Message transfer	ON / OFF	OFF	NG
061	Transfer greeting	CHECK/RECORD ERASE	CHECK	NG
067	ICM monitor	1:ON / 2:OFF	ON	OK
070	Pager transfer	ON / OFF	OFF	NG
075	IQ-FAX	1:ON / 2:OFF	OFF	OK
076	FAX tone	1:ON / 2:OFF	ON	OK
077	Auto answer mode	1:TAD/FAX 2: FAX Only 3:TEL/FAX	TAD/FAX	OK
078	TEL/FAX ring	1 to 4 rings	2	OK
079	Film detection	1:ON / 2:OFF	ON	OK
080	Set default	YES / NO	NO	NG
501	Pause time set	001~600 x 100msec	050	OK
503	Dial speed	1:10pps / 2:20 pps	10pps	OK
510	Vox time	1:6sec / 2:4sec	6sec	OK
520	CED frequency select	1:2100Hz / 2:1100Hz	2100	OK
521	International mode select	1:ON / 2:OFF	ON	OK
522	Auto standby select	1:ON / 2:OFF	ON	OK
523	Receive equalizer select	1:0km / 2:1.8km / 3:3.6km / 4:7.2km	0km	OK
524	Transmission equalizer select	1:0km / 2:1.8km / 3:3.6km / 4:7.2km	0km	OK
533	Setting the number of times that message transfer is redialed.	00~99	03	OK
534	Setting of the message transfer/pager call redial interval	001~999	030	OK
550	Memory clear	---------	---------	NG
551	ROM check	---------	---------	NG
552	DTMF signal tone test	ON / OFF	OFF	OK
553	Monitor on FAX communication	1:OFF / 2:Phase B / 3:ALL	OFF	OK
554	Modem test	---------	---------	NG
555	Scanner test	---------	---------	NG
556	Motor test	---------	---------	NG
557	LED test	---------	---------	NG
558	LCD test	---------	---------	NG
559	Document jam detection	1:ON / 2:OFF	ON	OK
561	Key test	---------	---------	NG
570	Break % select	1:61% / 2:67%	61%	OK
571	ITS auto redial time set	00~99	14	OK
572	ITS auto redial line disconnection time set	001~999sec	30	OK
573	Remote turn-on ring number	01~99	15	OK

Code	Function	Set Value	Default	Remote Setting
580	TAM continuous tone detection	1:ON / 2:OFF	ON	OK
590	FAX auto redial time set	00~99	05	OK
591	FAX auto redial line disconnection time set	001~999sec	045	OK
592	CNG transmit select	1:OFF / 2:ALL / 3:AUTO	ALL	OK
593	Time between CED and 300 bps	1:75ms / 2:500ms / 3:1sec	75ms	OK
594	Overseas DIS detection	1:1st / 2:2nd	1st	OK
595	Receive error limit value	001~999	100	OK
596	Transmit level set	-15~00dBm	0	OK
598	Receiving Sensitivity	20~48	43	OK
602	Warning list printing	1:ON / 2:OFF	ON	OK
717	Transmit speed select	1:14400/ 2:12000/ 3:9600/ 4:7200/ 5:4800/ 6:2400	14400bps	OK
718	Receive speed select	1:14400/ 2:12000/ 3:9600/ 4:7200/ 5:4800/ 6:2400	14400bps	OK
719	Ringer off in TEL/FAX mode	1:ON / 2:OFF	ON	OK
721	Pause tone detect	1:ON / 2:OFF	ON	OK
722	Redial tone detect	1:ON / 2:OFF	ON	OK
731	CPC mode	1:A / 2:B / 3:OFF	A	OK
732	Auto disconnect	1:350ms / 2:1800ms / 3:OFF	350msec	OK
745	Power on film feed	1:ON / 2:OFF	ON	OK
763	CNG detect time for friendly reception	1:10s / 2:20s / 3:30s	20s	OK
771	T1 timer	1:35s / 2:60s	35s	OK
775	Monitoring of message transfer	1:ON / 2:OFF	OFF	OK
784	Voice prompt	1:Start	---	NG
815	Sensor & VOX test	---	---	NG
841	Digital SP-Phone RX & TX check	1:SP-Phone	---	NG
852	Print test pattern	---	---	NG
853	Top margin	1~9	---	OK
854	Left margin	1~8	---	OK
861	A4 size set	1:ON / 2:OFF	OFF	OK
880	History list	1:Start	---	NG
881	Journal 2	1:Start	---	NG
882	Journal 3	1:Start	---	NG
890	TEL/FAX ring back tone	1:ON / 2:OFF	ON	OK
895	TEL/FAX Receive mode	1:TAD/FAX / 2:FAX	FAX	OK
991	Setup list	1:Start	---	OK
994	Journal list	1:Start	---	OK
995	Journal 2 list	1:Start	---	OK
996	Journal 3 list	1:Start	---	OK
998	History list	1:Start	---	OK
999	Service list	1:Start	---	OK

OK means "can set".

NG means "can not set".

Note:

Refer to **2.4.4. SERVICE FUNCTION TABLE** for descriptions of the individual codes.

Example:

If you want to set value in the "004 Transmission report mode", press the dial key number 1 , 2 or 3 corresponding to the Set Value you want to select. (1:ERROR/2:ON/3:OFF)

2.3.3.4. Digital Board Section

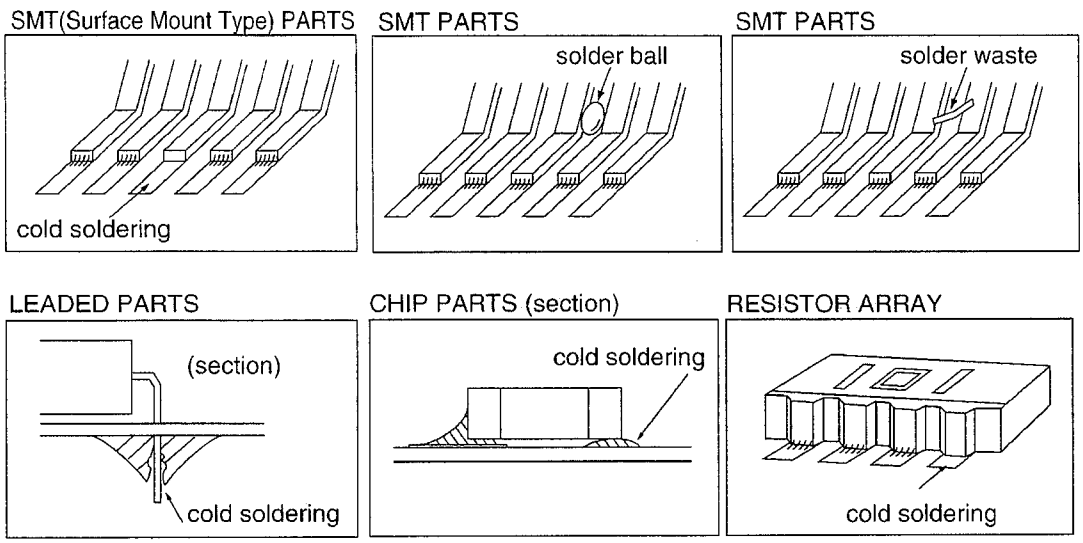
When the unit fails to boot up the system, take the troubleshooting procedures very carefully. It may have a serious problem.

The symptom: No response when the power is turned on. (No LCD display, and keys are not accepted.)

The first step is to check the power source. If there is no problem with the power supply unit, the problem may lie in the digital unit (main board).

As there are many potential causes in this case (ASIC, DRAM, etc.), it may be difficult to specify what you should check first. If a mistake is made in the order of checks, a normal part may be determined faulty, wasting both time and money.

Although the tendency is to regard the problem as a serious one (IC malfunction, etc.), usually most cases are caused by solder faults (poor contact due to a tunnel in the solder, signal short circuit due to solder waste).



Note:

1. Electrical continuity may have existed at the factory check, but a faulty contact occurred as a result of vibration, etc., during transport.
2. Solder waste remaining on the board may get caught under the IC during transport, causing a short circuit.

Before we begin mass production, several hundred trial units are produced at the plant, various tests are applied and any malfunctions are analyzed. (In past experiences, digital IC (especially SRAM, DRAM and ROM) malfunctions are extremely rare after installation in the product.)

This may be repaired by replacing the IC, (DRAM etc.). However, the real cause may not have been an IC malfunction but a soldering fault instead.

Soldering faults difficult to detect with the naked eye are common, particularly for ASIC and RA (Resistor Array). But if you have an oscilloscope, you can easily determine the problem site or IC malfunction by checking the main signal lines.

Even if you don't have such a measuring instrument, by checking each main signal line and resoldering it, in many cases the problem will be resolved.

An explanation of the main signals (for booting up the unit) is presented below.

> Don't replace ICs or stop repairing until checking the signal lines.
> An IC malfunction rarely occurs. (By understanding the necessary signals for booting up the unit, the "Not Boot up" display is not a serious problem.)

What are the main signals for booting up the unit?

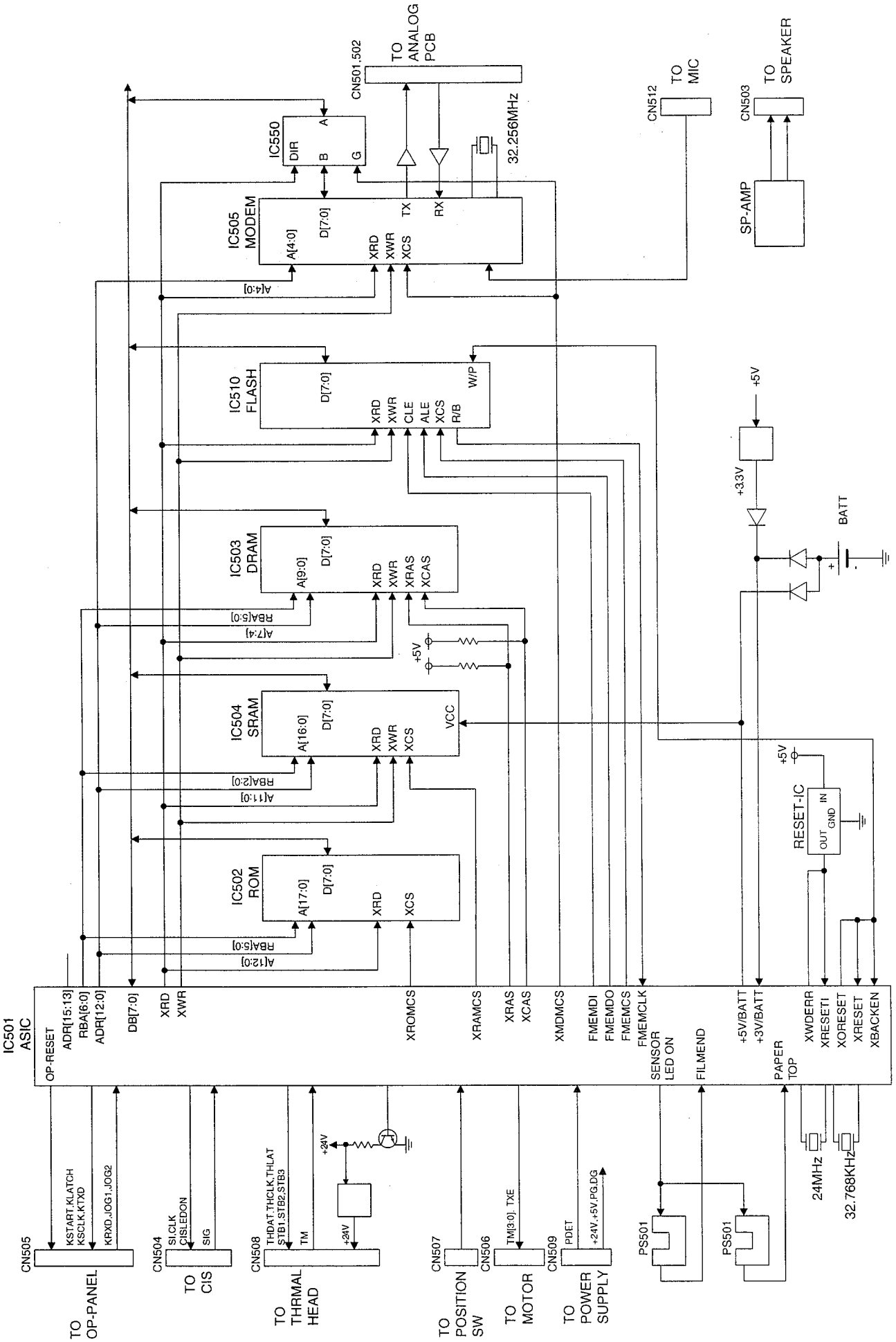
Please refer to **2.3.3.4.1. Digital Block Diagram**.

The ASIC (IC501) controls all the other digital ICs. When the power is turned on, the ASIC retrieves the operation code stored in the ROM (IC502), then follows the instructions for controlling each IC. All ICs have some inner registers that are assigned to a certain address.

It is the address bus by which the ASIC designates the location inside each IC. And the data bus reads or writes the data in order to transmit the instructions from the ASIC to the ICs.

These signal lines are all controlled by voltages of 5V (H) or 0V (L).

2.3.3.4.1. Digital Block Diagram



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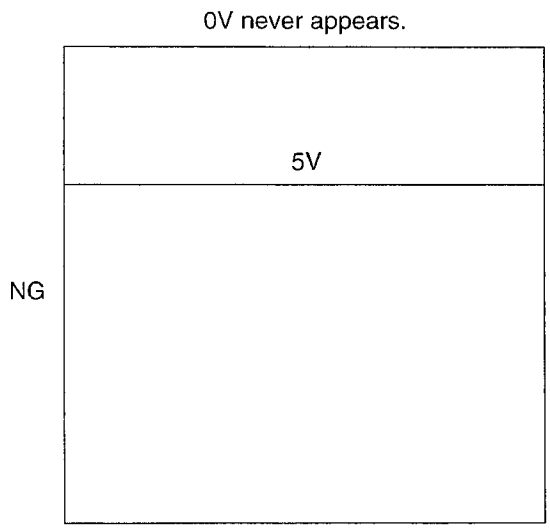
You also need to check the signal lines listed here [List 1] when the unit fails to boot up the system. Those signal lines should remain normal. Other signal lines are not directly related to that failure even if they have faults or troubles.

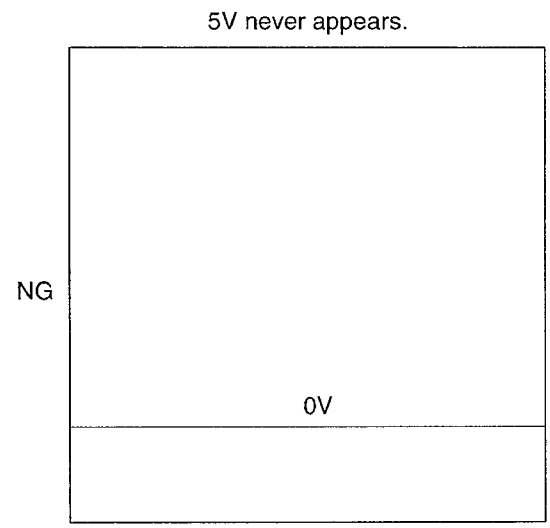
[List 1]

①	D0~D7	(Data Bus)
②	A0~A15	(Address Bus)
③	$\overline{RD}$	(Read Signal)
	$\overline{ROMCS}$	(ROM Select Signal)
	$\overline{WR}$	(Write Signal)
	$\overline{RAMCS}$	(SRAM Select Signal)
④	RBA0~RBA5	(Bank Address Signal)
⑤	$\overline{RAS}$	(DRAM Row Address Strobe Signal)
	$\overline{CAS}$	(DRAM Column Address Strobe Signal)
⑥	$\overline{MDMCS}$	(Modem Select Signal)

As long as these signals remain normal, once the power is turned on, each IC can repeatedly output 5V (H) and 0V (L). The following shows NG and normal wave patterns.

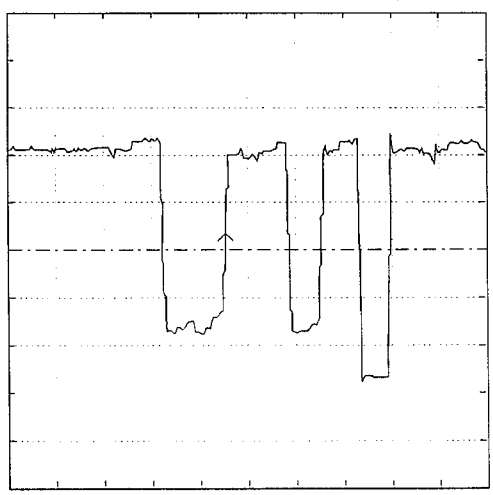
NG Wave pattern (Refer to NG EXAMPLE)





Short between D0 and D1

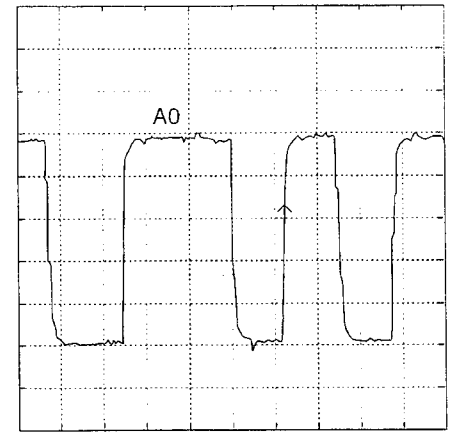
500ns/div, 1V/div



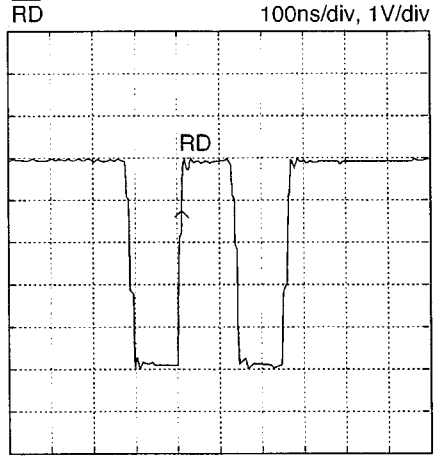
Normal Wave Patterns

① D0~D7 200ns/div, 1V/div

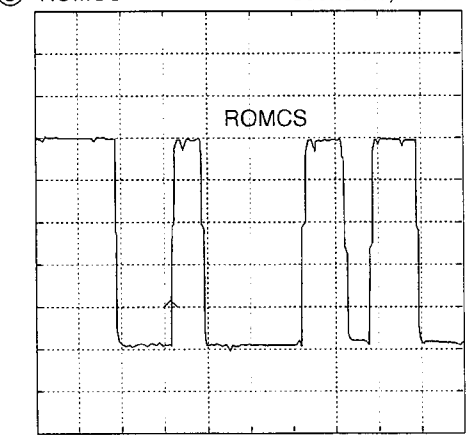
② A0~A5 200ns/div, 1V/div



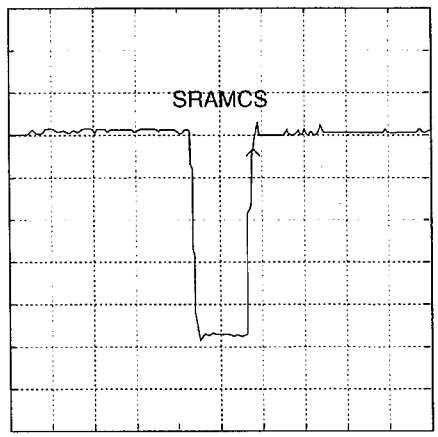
③ $\overline{RD}$ 100ns/div, 1V/div



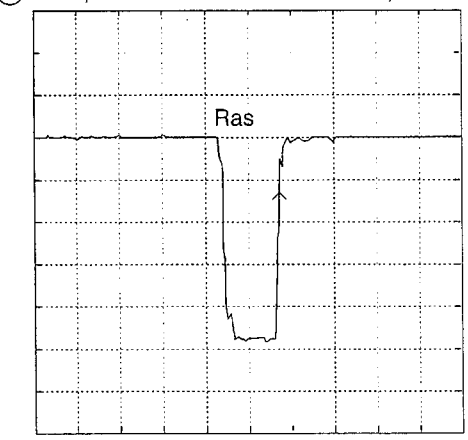
③ $\overline{ROMCS}$ 500ns/div, 1V/div



③ $\overline{RAMCS}$ 500ns/div, 1V/div



⑤ $\overline{RAS}$, $\overline{CAS}$ 100ns/div, 1V/div



Remarks:

When you use an oscilloscope to judge whether a signal to be tested is normal or NG, perform the signal check in exactly the same order as in [List 1]. (If the ASIC fails to access the ROM, the ASIC cannot access SRAM or DRAM normally.)

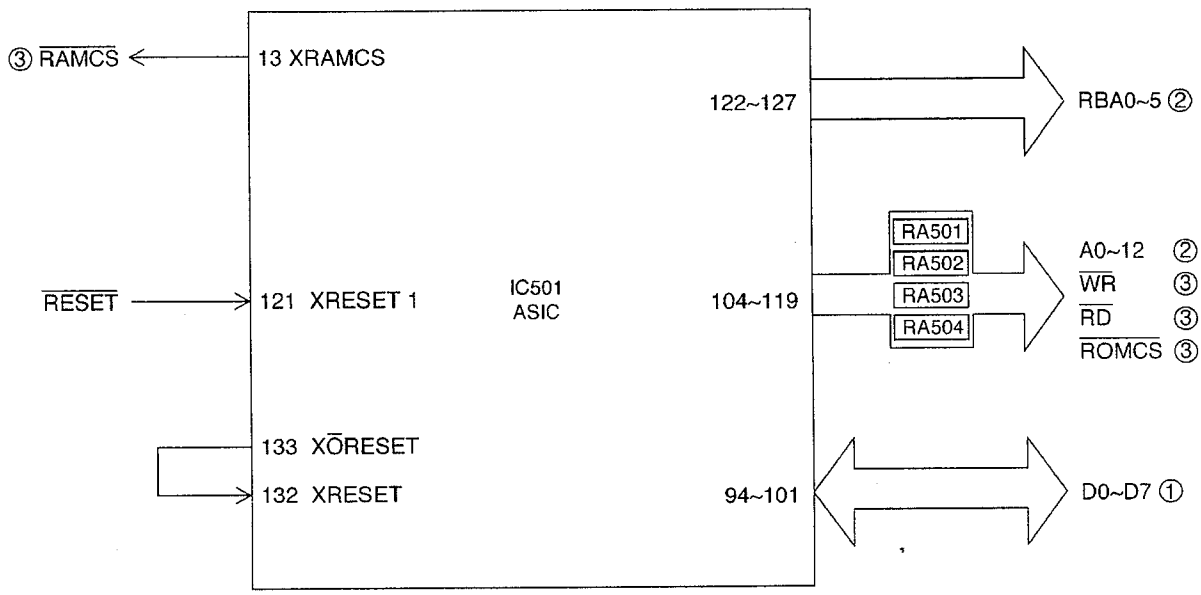
The digital circuit actually operates according to the timing combinations of these signals. If the timing of these signals is even slightly delayed, the circuit will not work. Nor will it if the IC is defective and the output voltage level is not normal although the timing of these signals is accurate enough to meet the specifications. (Make sure that your oscilloscope is calibrated before starting a test.)

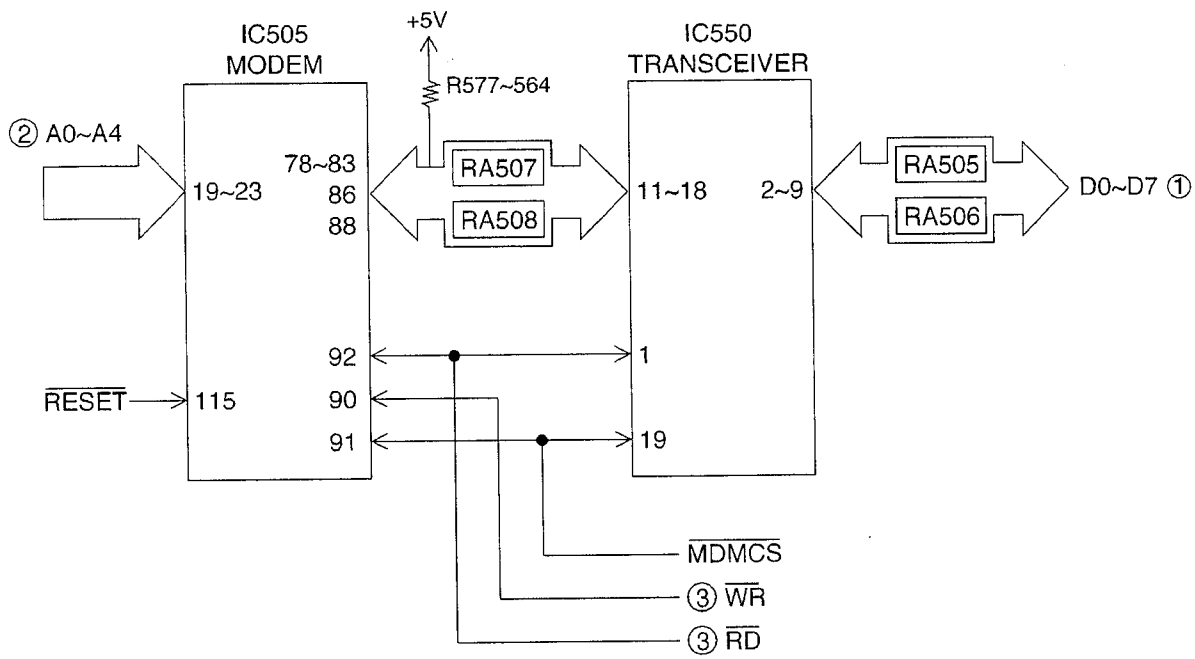
Therefore, it is imperative to confirm whether each IC outputs the signal at the correct level. (See the **I/O Pin No. Diagram**.) The signal level should be constantly output at between 5V (H) and 0V (L) as described earlier.

Note:

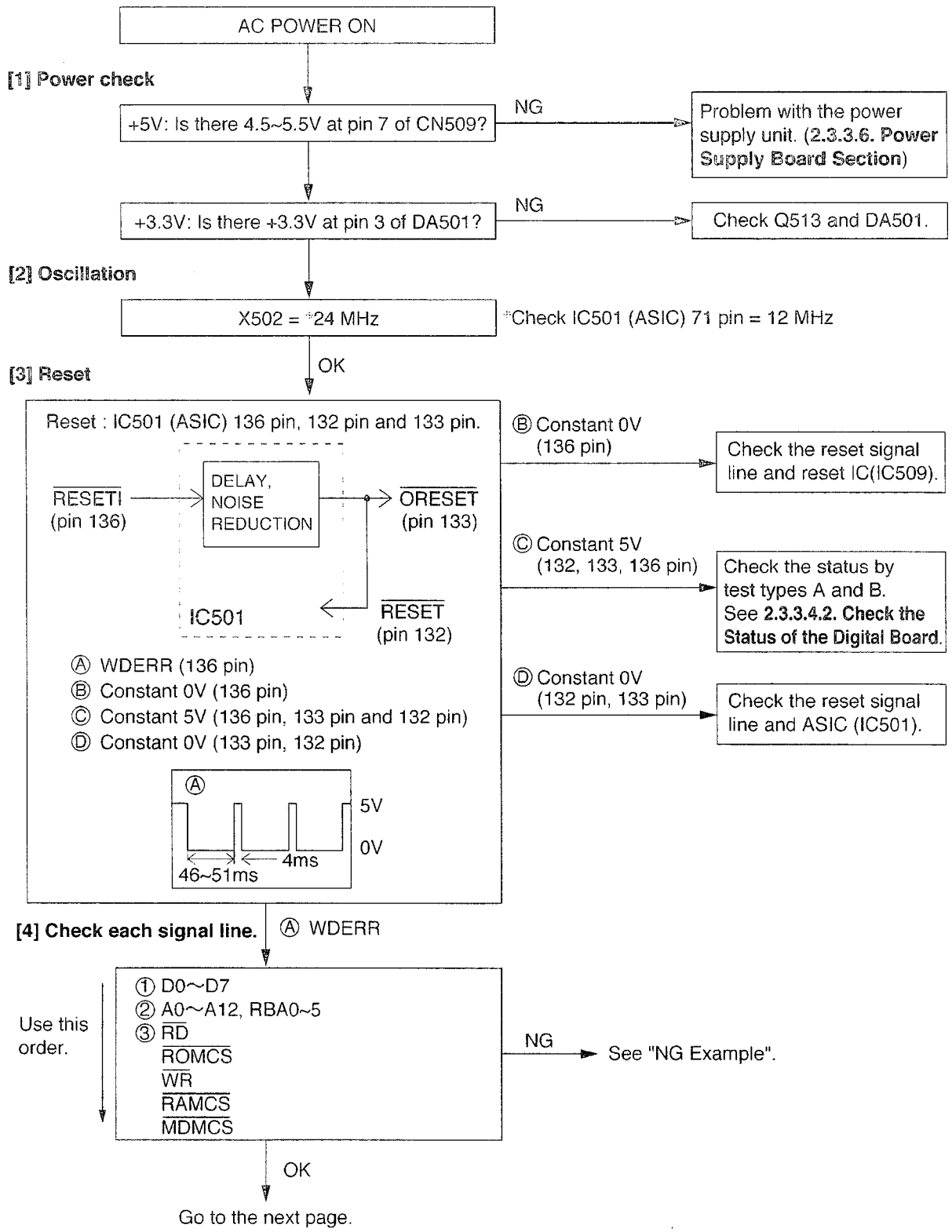
Simply check the output level and make sure if the IC repeatedly outputs the signal at between 5V (H) and 0V (L).

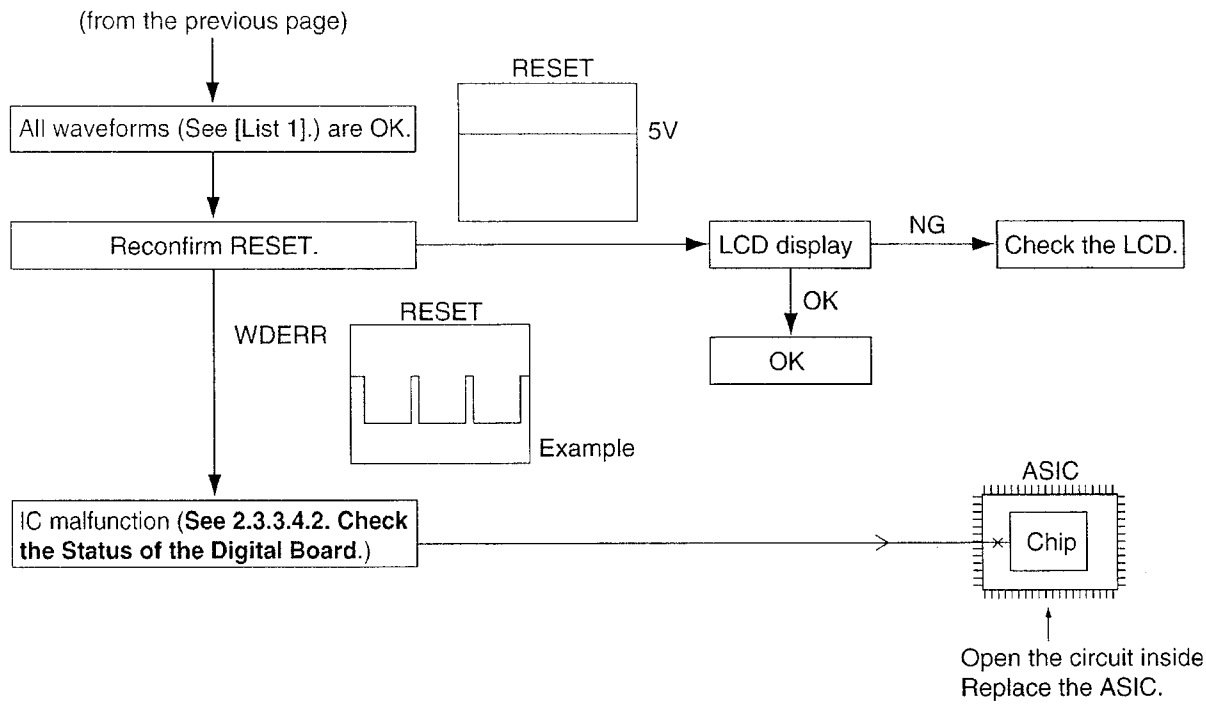
I/O and Pin No. Diagram



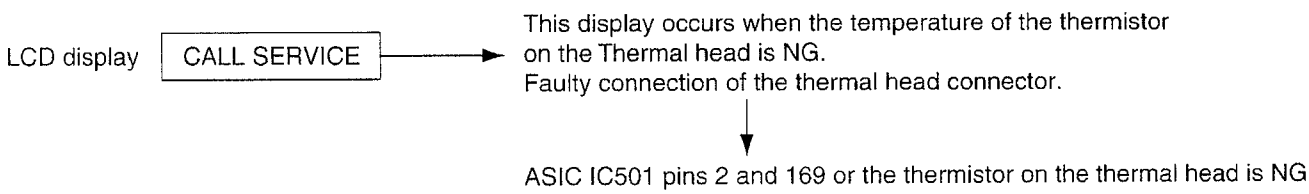


After the power is turned on, the ASIC initializes and checks each IC.
The ROM, SRAM, and modem are checked.
If initialization fails for the ICs , the system will not boot up.
In this case, please find the cause as follows.


AC POWER ON
[1] Power check
+5V: Is there 4.5~5.5V at pin 7 of CN509?
NG
Problem with the power supply unit. (2.3.3.6. Power Supply Board Section)
+3.3V: Is there +3.3V at pin 3 of DA501?
NG
Check Q513 and DA501.
[2] Oscillation
X502 = 24 MHz
Check IC501 (ASIC) 71 pin = 12 MHz
OK
[3] Reset
Reset : IC501 (ASIC) 136 pin, 132 pin and 133 pin.
RESETI (pin 136)
DELAY, NOISE REDUCTION
ORESET (pin 133)
IC501
RESET (pin 132)
Ⓐ WDERR (136 pin)
Ⓑ Constant 0V (136 pin)
Ⓒ Constant 5V (136 pin, 133 pin and 132 pin)
Ⓓ Constant 0V (133 pin, 132 pin)
Ⓐ
5V
0V
4ms
46~51ms
Ⓑ Constant 0V (136 pin)
Check the reset signal line and reset IC(IC509).
Ⓒ Constant 5V (132, 133, 136 pin)
Check the status by test types A and B. See 2.3.3.4.2. Check the Status of the Digital Board.
Ⓓ Constant 0V (132 pin, 133 pin)
Check the reset signal line and ASIC (IC501).
[4] Check each signal line.
Ⓐ WDERR
Use this order.
① D0~D7
② A0~A12, RBA0~5
③ RD
ROMCS
WR
RAMCS
MDMCS
NG
See "NG Example".
OK
Go to the next page.

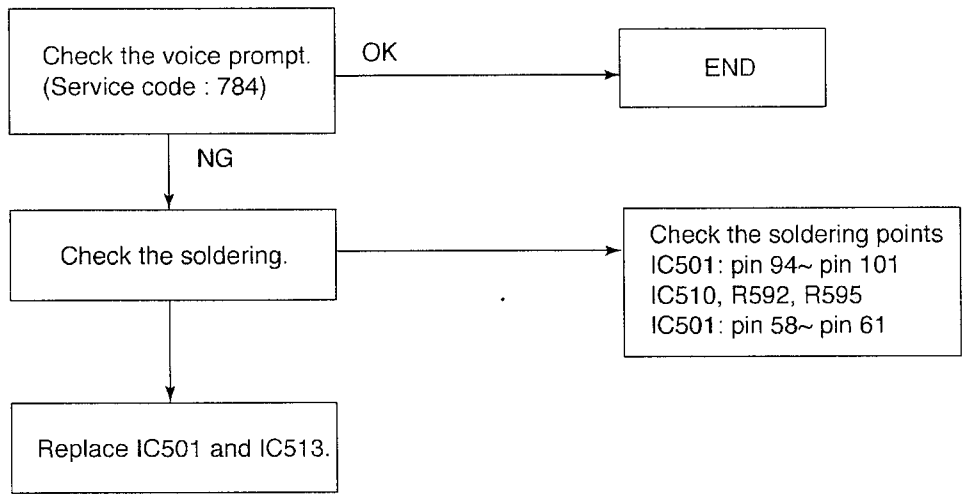


Other NG examples while the power is ON and the LCD displays the following.


LCD display
CALL SERVICE
This display occurs when the temperature of the thermistor on the Thermal head is NG.
Faulty connection of the thermal head connector.
ASIC IC501 pins 2 and 169 or the thermistor on the thermal head is NG.

FLASH MEMORY (IC510)

If the unit is working correctly but the VOICE GUIDANCE (voice prompt) is not audible, you should check the Flash Memory.

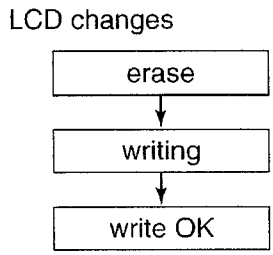


A voice message is pre-recorded in the Flash Memory (IC510). So, when you find an IC510 malfunction and replace it with a new one. You have to pre-record the voice message by using a special ROM.

How to Use the Special ROM

(Voice Message Recording ROM)

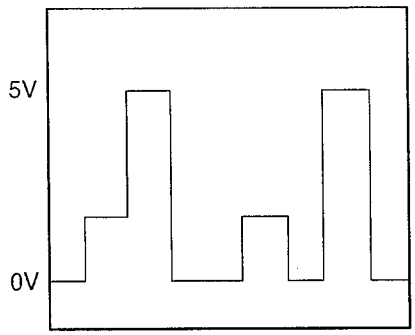
1. Turn the AC power OFF.
2. Replace the regular system ROM with the special ROM.
3. Turn the AC power ON.
4. The Voice Message Recording starts automatically.



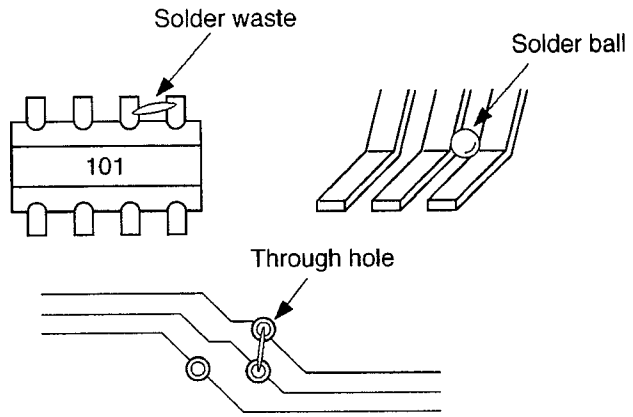
5. Turn the AC power OFF.
6. Replace the special ROM with the regular system ROM.

NG Example

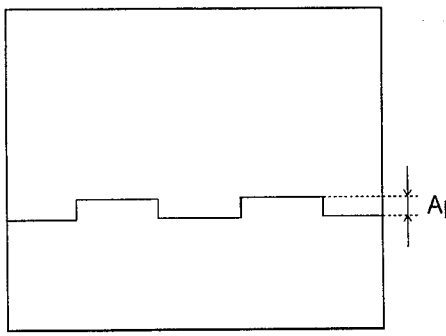
1.



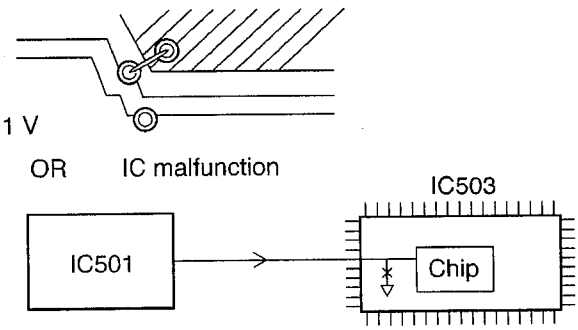
Short circuit from the adjacent signal wires.
Check for a short circuit in the RA and IC leads and the signal wire at the through hole.



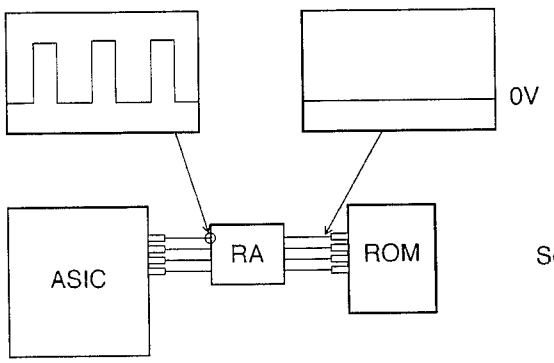
2.



Short between the signal line and GND.



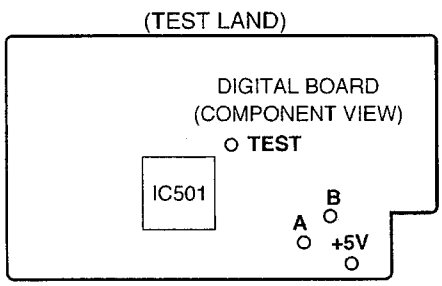
3.

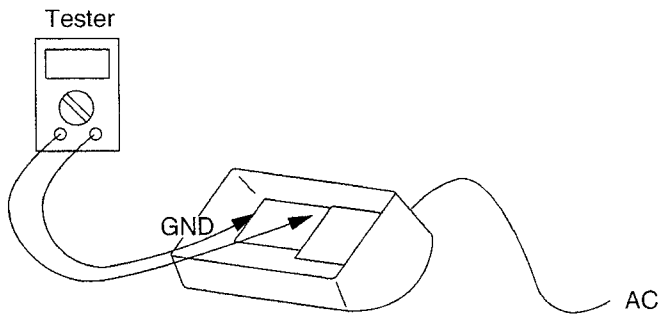


Solder fault on RA.

2.3.3.4.2. Check the Status of the Digital Board

Check the status (voltage) of test lands **A** and **B**.
The result may tell you a defective point.





- Turn off the power supply.
- Short using a metallic object, such as tweezers, between the **TEST** POINT and **+5V** land, and turn on the AC power for a few seconds. And then remove a metallic object.
- Check the following voltages using an oscilloscope or tester.
- To cancel the status check mode, turn off the AC power.

Defective point	Check point voltage		Check items
	A	B	
RTC (IC501)	0V	0V	IC501(RTC is included in IC501)
DRAM (IC503)	0V	5V	IC503(8,23 pin), R533, R534, C547, C549, IC501(88, 89 pin)
MODEM (IC505)	5V	0V	IC501(77 pin), IC505(115, 116, 117, 90, 91, 92 pin), R557~R564, RA508, RA507, RA505, RA506, IC550
ALL OK	5V	5V	

- This indicates that the Add/Data Bus, RAM, ROM, MODEM, and ASIC are all connected to the ASIC properly and that control from the ASIC is possible.

Please check the soldering and conduction of these components.
If there is no problem, replace the ICs.

If you still have a problem with the digital board, refer to **NG wave pattern**.

2.3.3.5. Analog Board Section

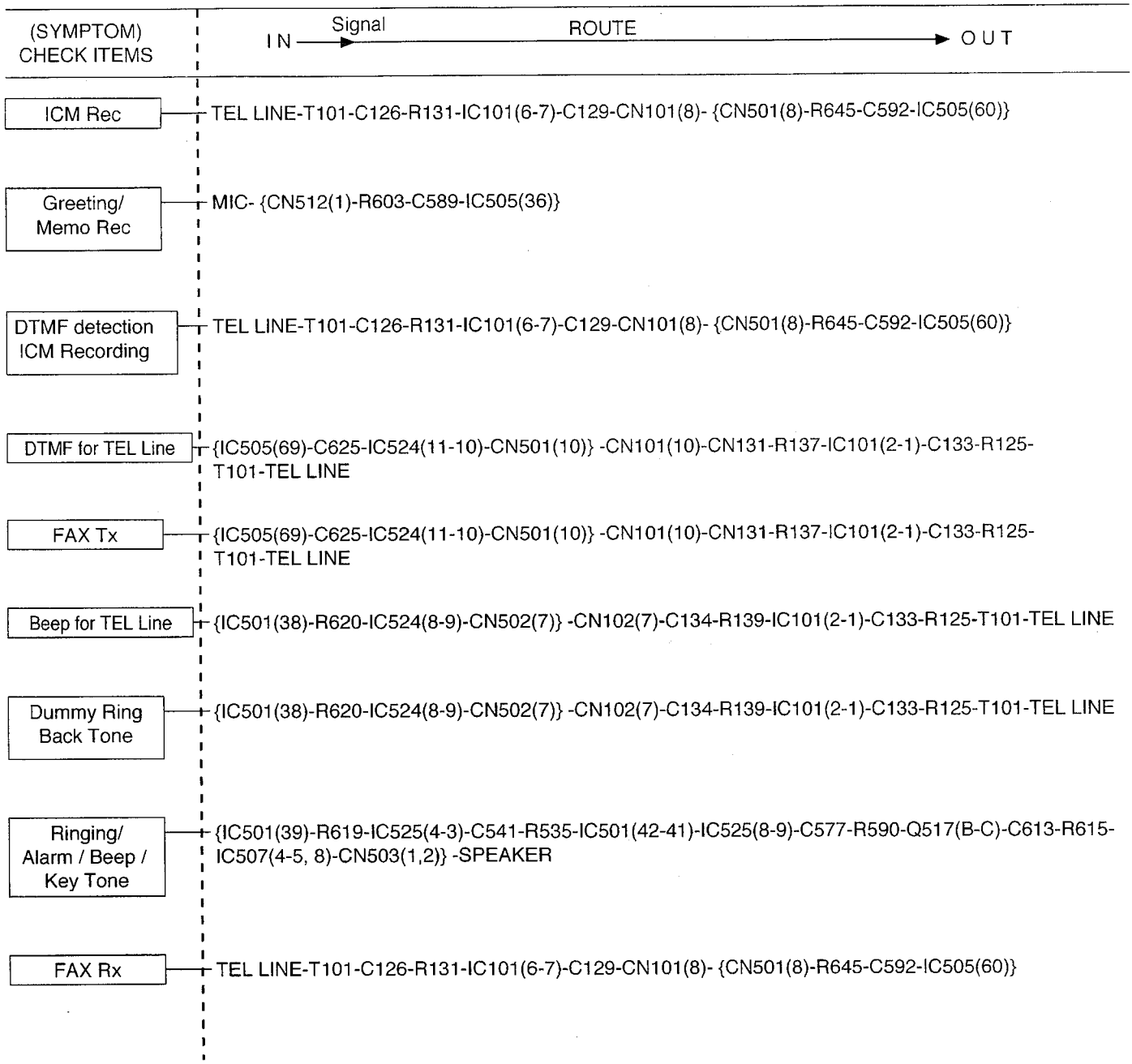
This chapter provides the testing procedures required for the analog parts. A signal route to be tested is determined depending upon purposes. For example, the handset TX route begins at the handset microphone and the signal is output to the telephone line. The signal mainly flowing on this route is analog. You can trace the signal with an oscilloscope. The signal flow on each route is shown in the Check Sheet here. If you find a specific problem in the unit, for example if you cannot communicate with the H/S, trace that signal route locally with the following Check Sheet and locate the faulty point.

CHECK SHEET

(SYMPTOM) CHECK ITEMS	IN → Signal ROUTE → OUT
SP-PHONE Tx	MIC- {CN512(1)-R603-C589-IC505(36-69)-C625-IC524(11-10)-CN501(10)} -CN101(10)-CN131-R137-IC101(2-1)-C133-R125-T101-TEL LINE
SP-PHONE Rx	TEL LINE-T101-C126-R131-IC101(6-7)-C129-CN101(8)- {CN501(8)-R645-C592-IC505(60-47)-C576-R589-Q517(B-C)-C613-R615-IC507(4-5, 8)-CN503(1, 2)} -SPEAKER
HANDSET Tx	HANDSET MIC-CN105(4)-CN102(8)- {CN502(8)-R579-C571-IC505(34-69)-C625-IC524(11-10)-CN501(10)} -CN101(10)-CN131-R137-IC101(2-1)-C133-R125-T101-TEL LINE
HANDSET Rx	TEL LINE-T101-C126-R131-IC101(6-7)-C129-CN101(8)- {CN501(8)-R645-C592-IC505(60-43)-C572-R582-Q515(B-E)-C580-CN502(6)} -CN102(6)-CN105(2)-HANDSET SPEAKER
DTMF Monitor – Speaker	{IC505(47)-C576-R589-Q517(B-C)-C613-R615-IC507(4-5, 8)-CN503(1,2)} -SPEAKER
DTMF Monitor – Handset	{IC505(43)-C572-R582-Q515(B-E)-C580-CN502(6)} -CN102(6)-CN105(2)-HANDSET SPEAKER
CNG detection	TEL LINE-T101-C126-R131-IC101(6-7)-C129-CN101(8)- {CN501(8)-R645-C592-IC505(60)}
VOX detection	TEL LINE-T101-C126-R131-IC101(6-7)-C129-CN101(8)- {CN501(8)-R645-C592-IC505(60)}
Greeting for TEL Line / MSGS for TEL Line	{IC505(69)-C625-IC524(11-10)-CN501(10)} -CN101(10)-CN131-R137-IC101(2-1)-C133-R125-T101-TEL LINE

Note:

{ }: Inside the digital board



Note:

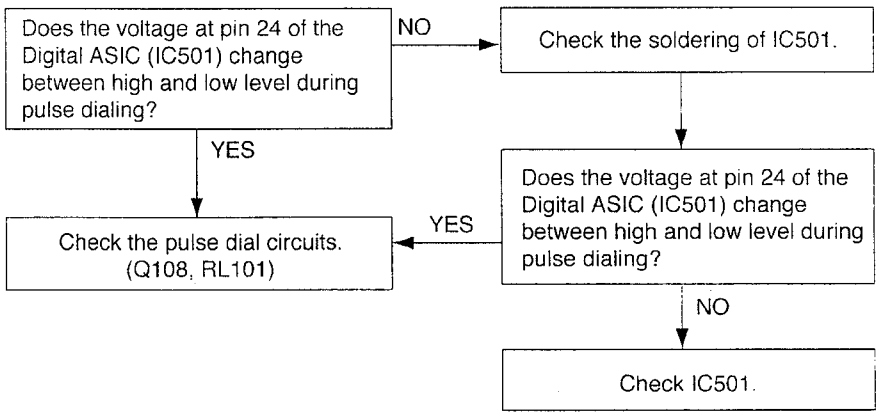
{ }: Inside the digital board

1. **Defective ITS (Integrated Telephone System) Section**

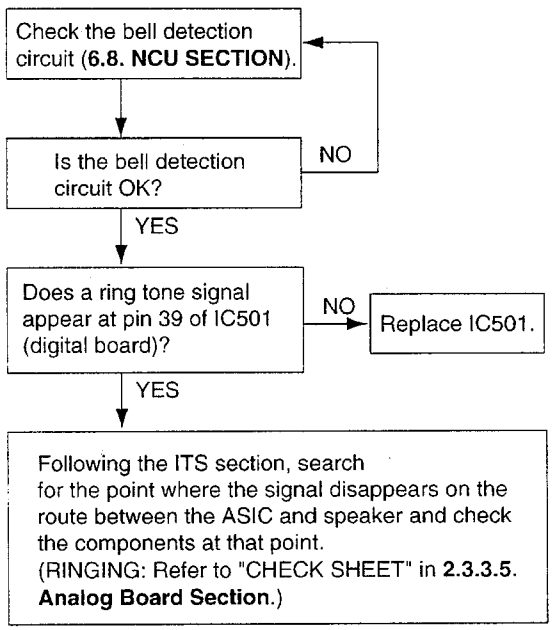
a. **No handset and speakerphone transmission / reception**

Perform a signal test in the **ITS or the NCU section** and locate a defective point (where the signal disappears) on each route between the handset microphone and telephone line (sending), or between the telephone line and the handset speaker (receiving), or between the microphone and the telephone line (sending), or between the telephone line and the speaker (receiving). Check the components at that point. "CHECK SHEET" in **2.3.3.5. Analog Board Section** is useful for this investigation.

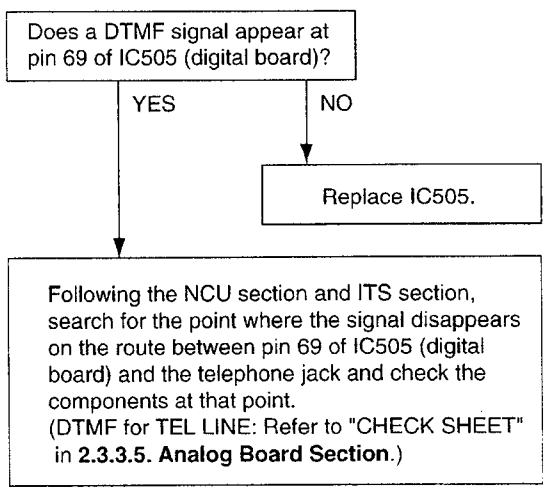
b. **No pulse dialing**


Does the voltage at pin 24 of the Digital ASIC (IC501) change between high and low level during pulse dialing?
NO
Check the soldering of IC501.
YES
Does the voltage at pin 24 of the Digital ASIC (IC501) change between high and low level during pulse dialing?
YES
Check the pulse dial circuits. (Q108, RL101)
NO
Check IC501.

c. **No ring tone (or No bell)**


Check the bell detection circuit (6.8. NCU SECTION).
Is the bell detection circuit OK?
NO
YES
Does a ring tone signal appear at pin 39 of IC501 (digital board)?
NO
Replace IC501.
YES
Following the ITS section, search for the point where the signal disappears on the route between the ASIC and speaker and check the components at that point.
(RINGING: Refer to "CHECK SHEET" in 2.3.3.5. Analog Board Section.)

d. **No tone dialing**


Does a DTMF signal appear at pin 69 of IC505 (digital board)?
YES
NO
Replace IC505.
Following the NCU section and ITS section, search for the point where the signal disappears on the route between pin 69 of IC505 (digital board) and the telephone jack and check the components at that point.
(DTMF for TEL LINE: Refer to "CHECK SHEET" in 2.3.3.5. Analog Board Section.)

2.3.3.5.1. Digital Speakerphone

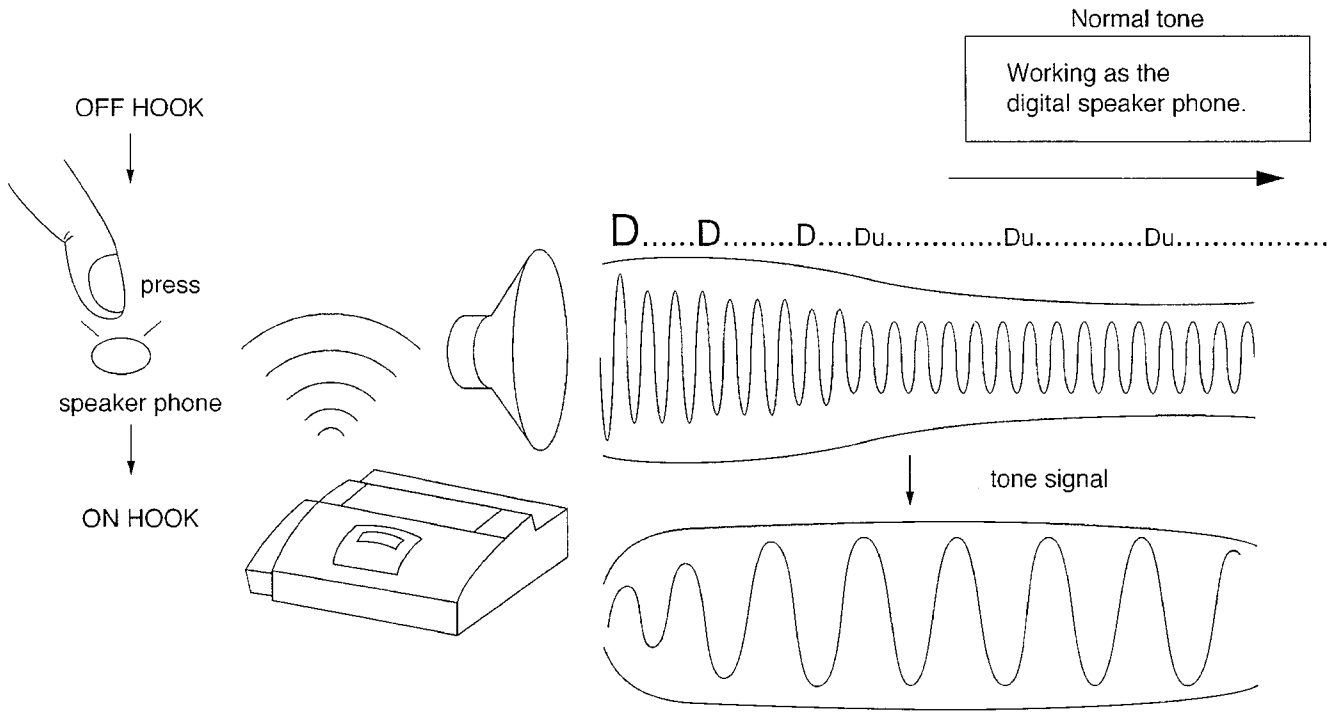
The digital speakerphone has different features from the analog speakerphone.

The analog speakerphone switches between Tx or Rx. Either Tx or Rx is able to pass through a telephone line or speaker, depending on the Tx and Rx signal (voice) level. The higher-level signal (either TX or RX) can pass through the route.

Therefore, you never hear the other party's voice while you are talking. However, the digital speakerphone allows you to hear the other party's voice while you are talking. So both Tx and Rx are active at the same time. There is also a defference in the troubleshooting procedures between the two types.

At the start of communication, during the initial 2~3 correspondences, the digital speakerphone performs half-duplex operation, alternating between transmission (Tx) and reception (Rx). Then duplex communication becomes available.

Learning occurs during the initial 2~3 correspondences in order to set the appropriate parameters for duplex communication.

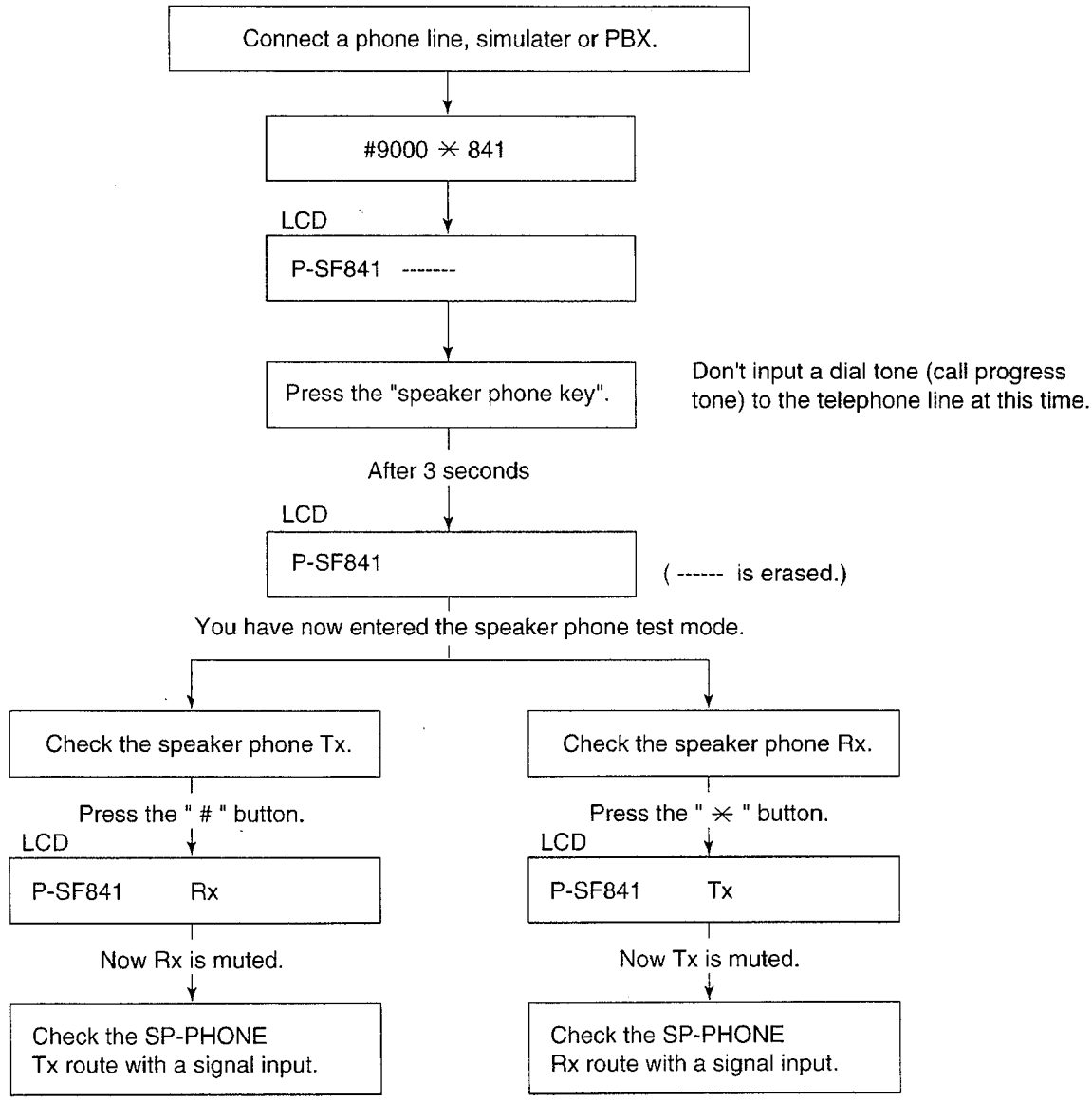


You cannot check the digital speaker phone by the signal route test mentioned in the Analog Board Section because the level is always changing as stated above.

Therefore, there is a service function for this troubleshooting. In this service mode, you can set the mute to either Tx or Rx. Then you can check the signal route of the speaker phone Tx or the speaker phone Rx without any disturbances.

HOW TO USE THE **841** SERVICE FUNCTION for THE DIGITAL SPEAKER PHONE

Please check by using the service function #9000 ✳ **841**.


Connect a phone line, simulater or PBX.
#9000 ✳ 841
LCD
P-SF841 --------
Press the "speaker phone key".
Don't input a dial tone (call progress tone) to the telephone line at this time.
After 3 seconds
LCD
P-SF841
(------ is erased.)
You have now entered the speaker phone test mode.
Check the speaker phone Tx.
Check the speaker phone Rx.
Press the " # " button.
Press the " ✳ " button.
LCD
LCD
P-SF841 Rx
P-SF841 Tx
Now Rx is muted.
Now Tx is muted.
Check the SP-PHONE Tx route with a signal input.
Check the SP-PHONE Rx route with a signal input.

Refer to **2.3.3.5. Analog Board Section**.

2.3.3.6. Power Supply Board Section

1. Key components for troubleshooting

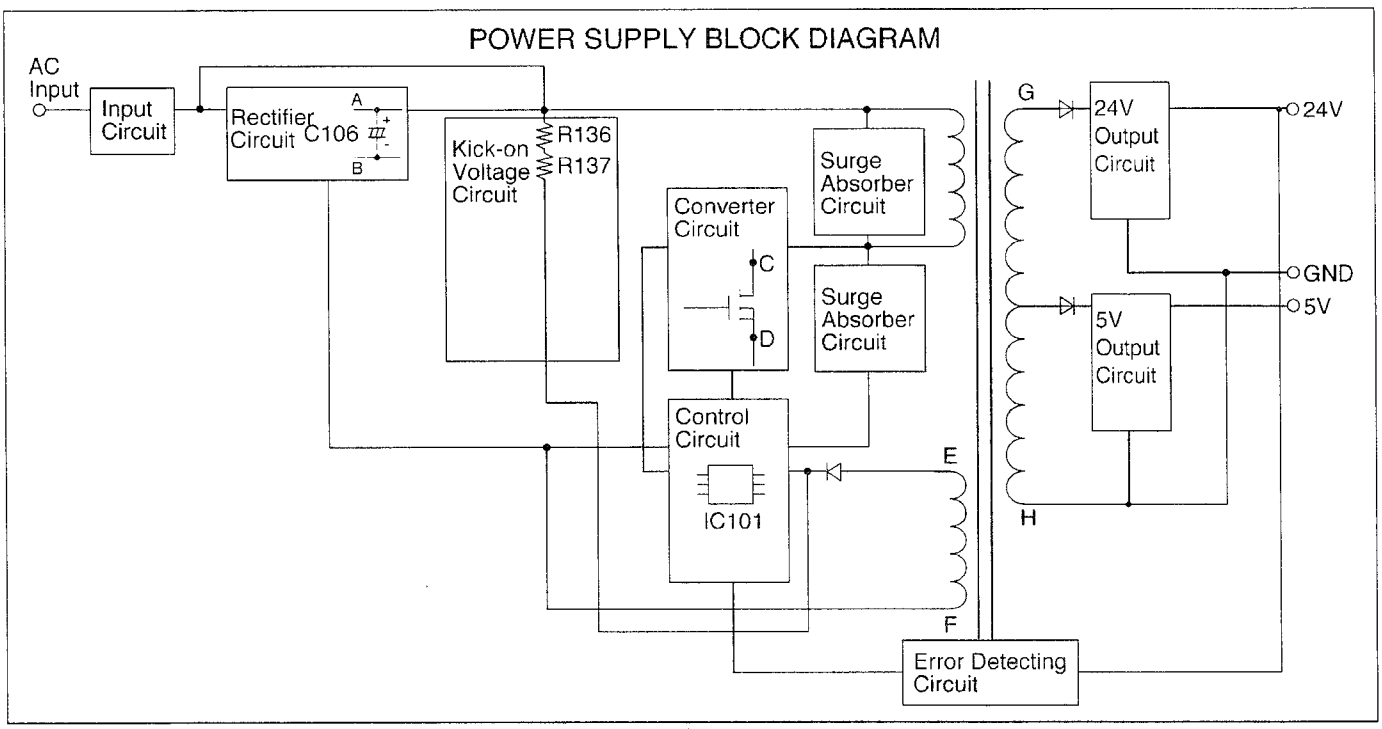
Check the following parts first: F101, D101-D104, C106, Q101, PC101 and IC101.

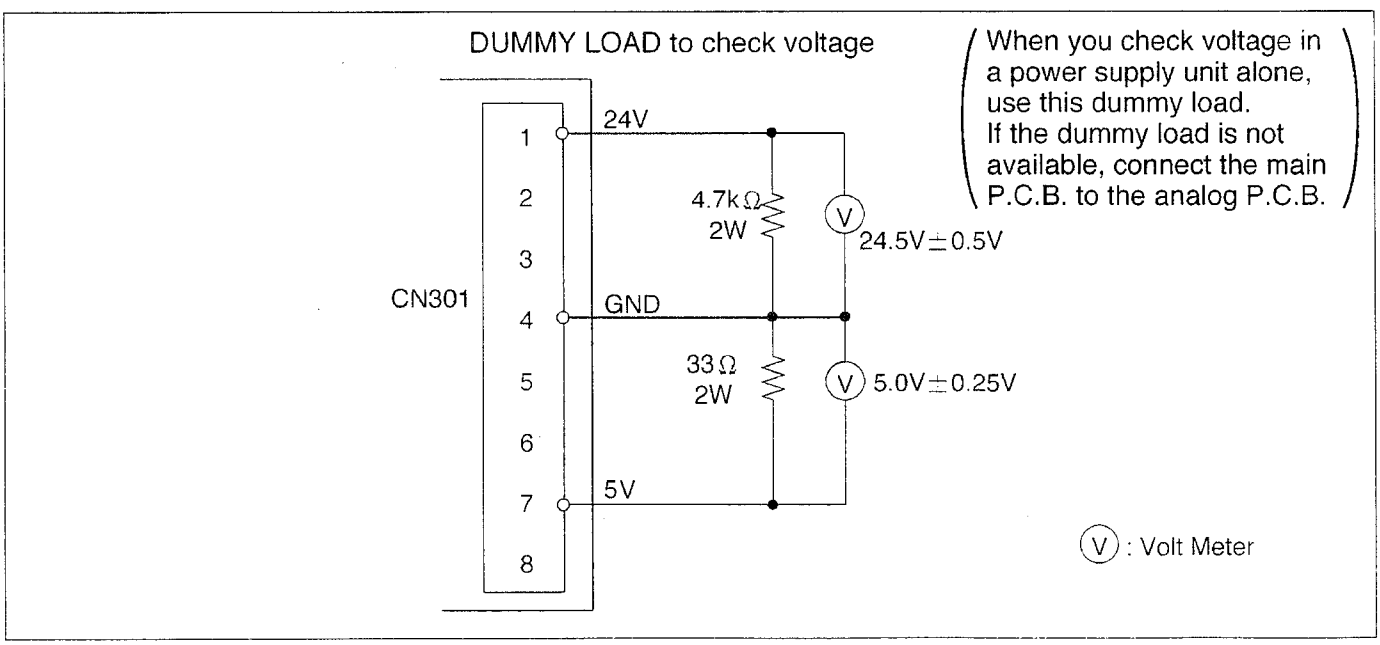
This comes from our experience with experimental tests. For example: power supply and lightning surge voltage test, withstanding voltage test, intentional short circuit test, etc.

Caution:

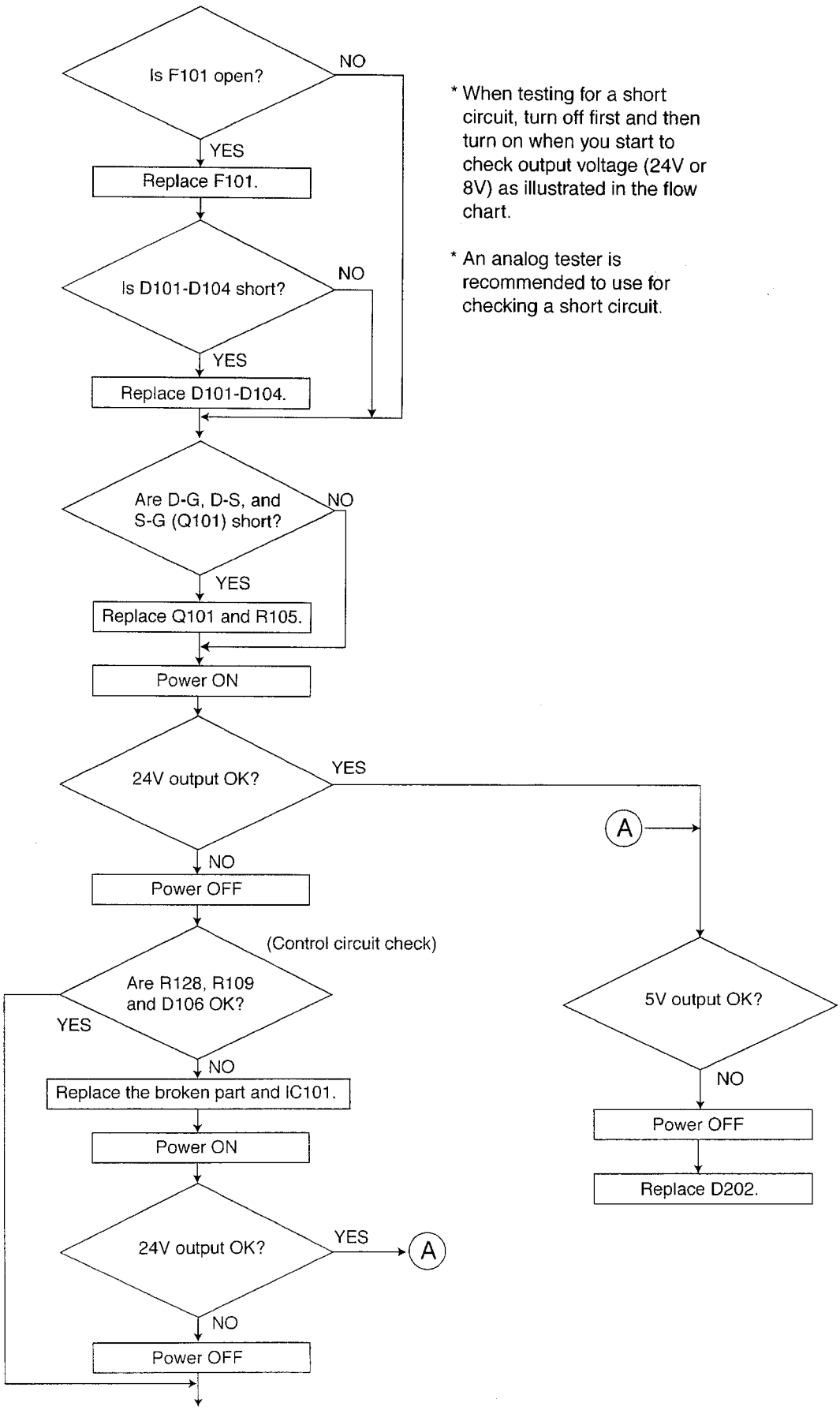
If you find a melted fuse in the unit, do not turn on the power until you locate and repair the faulty parts (except for the fuse); otherwise the fuse will melt again and you cannot pinpoint the faulty point.

In most cases, the symptom is that nothing is output. It is more likely that the fault is in the primary side rather than the secondary side. Check the primary side first.



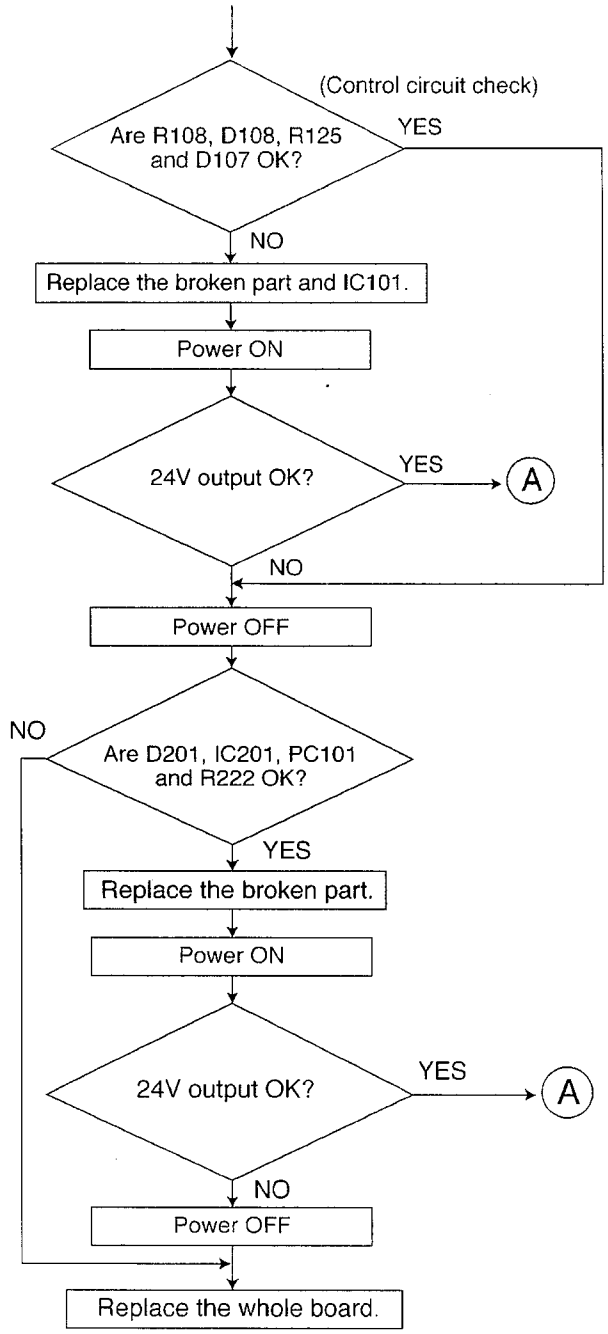


2. Troubleshooting Flow Chart



* When testing for a short circuit, turn off first and then turn on when you start to check output voltage (24V or 8V) as illustrated in the flow chart.

* An analog tester is recommended to use for checking a short circuit.



3. **Broken parts repair details**

(D101, D102, D103, D104)

Check for a short-circuit in terminal 4. If D101, D102, D103 and D104 are short-circuited, F101 will melt (open).

In this case, replace all of the parts (D101, D102, D103, D104, F101).

(Q101)

The worst case of Q101 is a short-circuit between the Drain and Gate because damage expands to the peripheral circuit of Q101.

This is due to a very high voltage through the Gate circuit which is composed of R128, R109, D106 and IC101.

You should change all of the parts listed as follows.

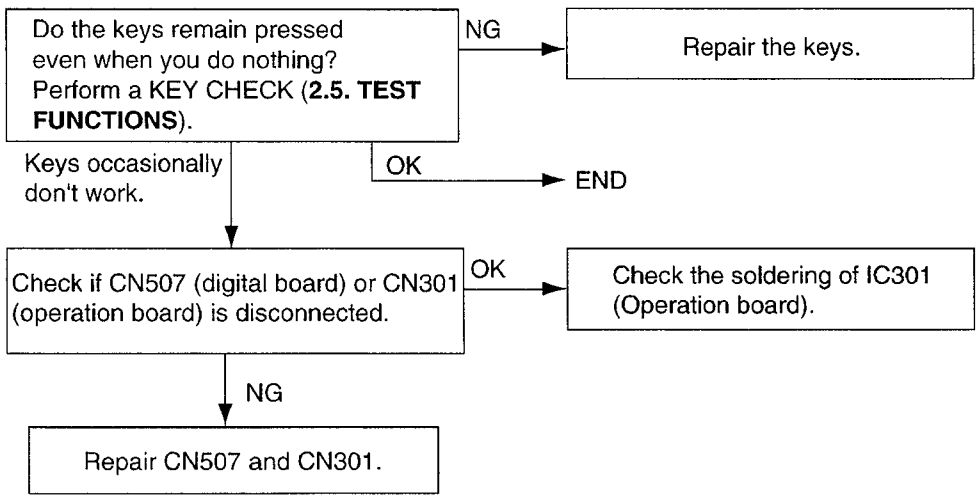
F101, Q101, R128, R109, D106, IC101

(D201)

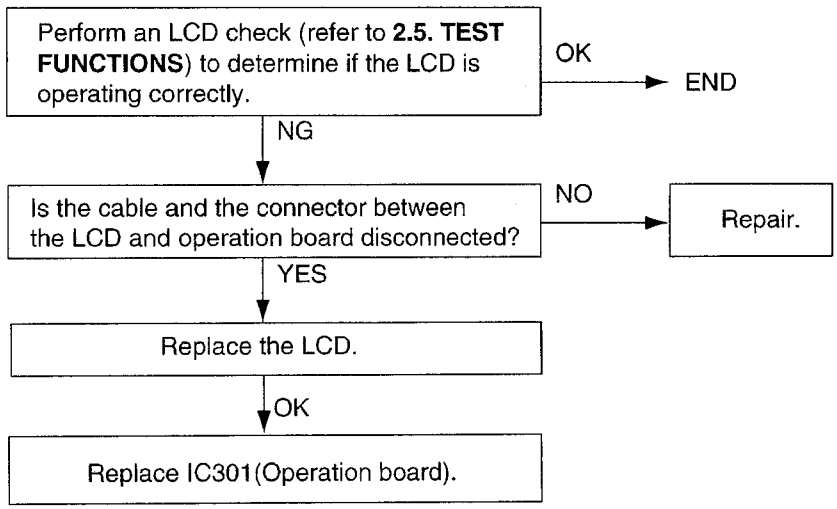
If D201 is broken, the oscillation circuit in the power supply cannot operate. Check it with an electric tester.

2.3.3.7. Operation Panel Section

1. **No key operation**


Do the keys remain pressed even when you do nothing? Perform a KEY CHECK (**2.5. TEST FUNCTIONS**).
NG
Repair the keys.
Keys occasionally don't work.
OK
END
Check if CN507 (digital board) or CN301 (operation board) is disconnected.
OK
Check the soldering of IC301 (Operation board).
NG
Repair CN507 and CN301.

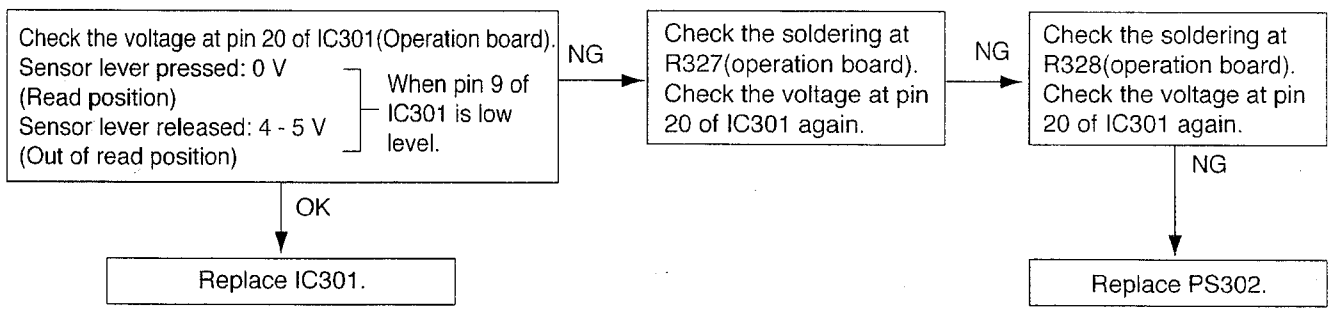
2. **No LCD indication**



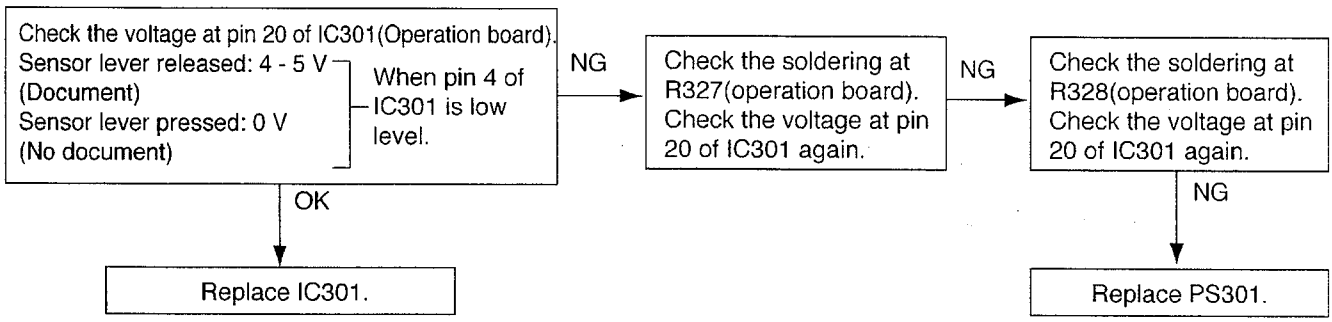
2.3.3.8. Sensor Board Section (Refer to 6.5. SENSORS AND SWITCHES for the circuit descriptions.)

The Test Function makes the sensor circuit check easier. (Refer to **2.5. TEST FUNCTIONS**.)
For example, as for "COVER OPEN SENSOR", "CO" is turned ON/OFF on the display when you open or close the front cover. Also, document sensor, read position sensor, recording paper sensor and jam sensor are turned ON/OFF by the copy operation. Therefore, each sensor can be checked for proper mechanical operation.
As for the electric check, check whether each voltage is right or not with following flowchart turning each sensor lever ON/OFF manually.

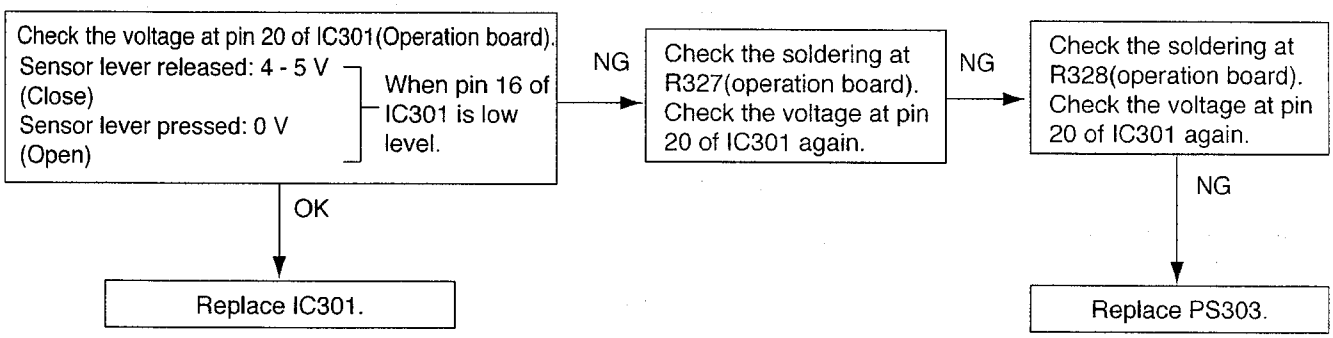
1. **Check the read position sensor (PS302)....."REMOVE DOCUMENT"**


Check the voltage at pin 20 of IC301(Operation board).
Sensor lever pressed: 0 V (Read position)
Sensor lever released: 4 - 5 V (Out of read position)
When pin 9 of IC301 is low level.
NG
Check the soldering at R327(operation board). Check the voltage at pin 20 of IC301 again.
NG
Check the soldering at R328(operation board). Check the voltage at pin 20 of IC301 again.
NG
OK
Replace IC301.
Replace PS302.

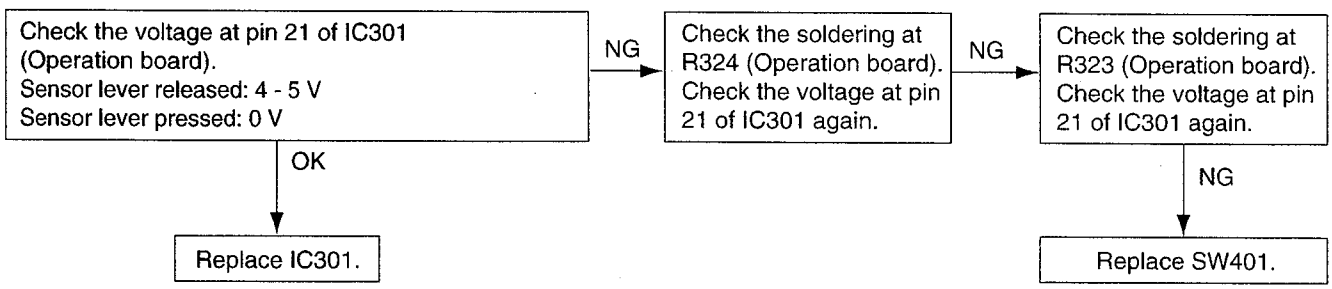
2. **Check the document sensor (PI302)....."CHECK DOCUMENT"**


Check the voltage at pin 20 of IC301(Operation board).
Sensor lever released: 4 - 5 V (Document)
Sensor lever pressed: 0 V (No document)
When pin 4 of IC301 is low level.
NG
Check the soldering at R327(operation board). Check the voltage at pin 20 of IC301 again.
NG
Check the soldering at R328(operation board). Check the voltage at pin 20 of IC301 again.
NG
OK
Replace IC301.
Replace PS301.

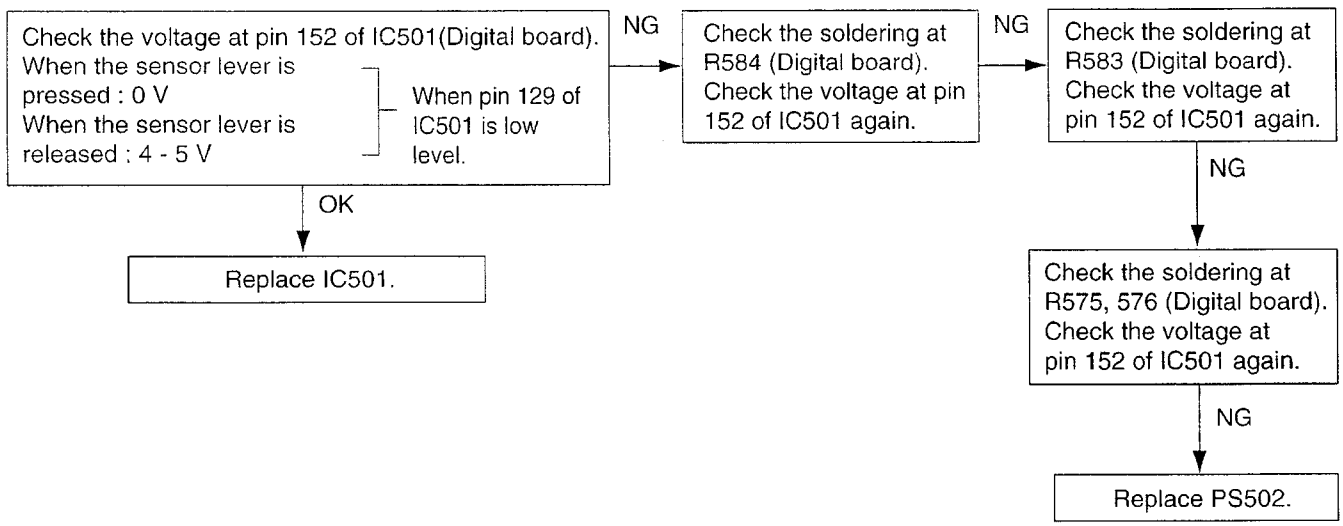
3. **Check the cover open sensor (PI303)....."CHECK COVER"**


Check the voltage at pin 20 of IC301(Operation board).
Sensor lever released: 4 - 5 V (Close)
Sensor lever pressed: 0 V (Open)
When pin 16 of IC301 is low level.
NG
Check the soldering at R327(operation board). Check the voltage at pin 20 of IC301 again.
NG
Check the soldering at R328(operation board). Check the voltage at pin 20 of IC301 again.
NG
OK
Replace IC301.
Replace PS303.

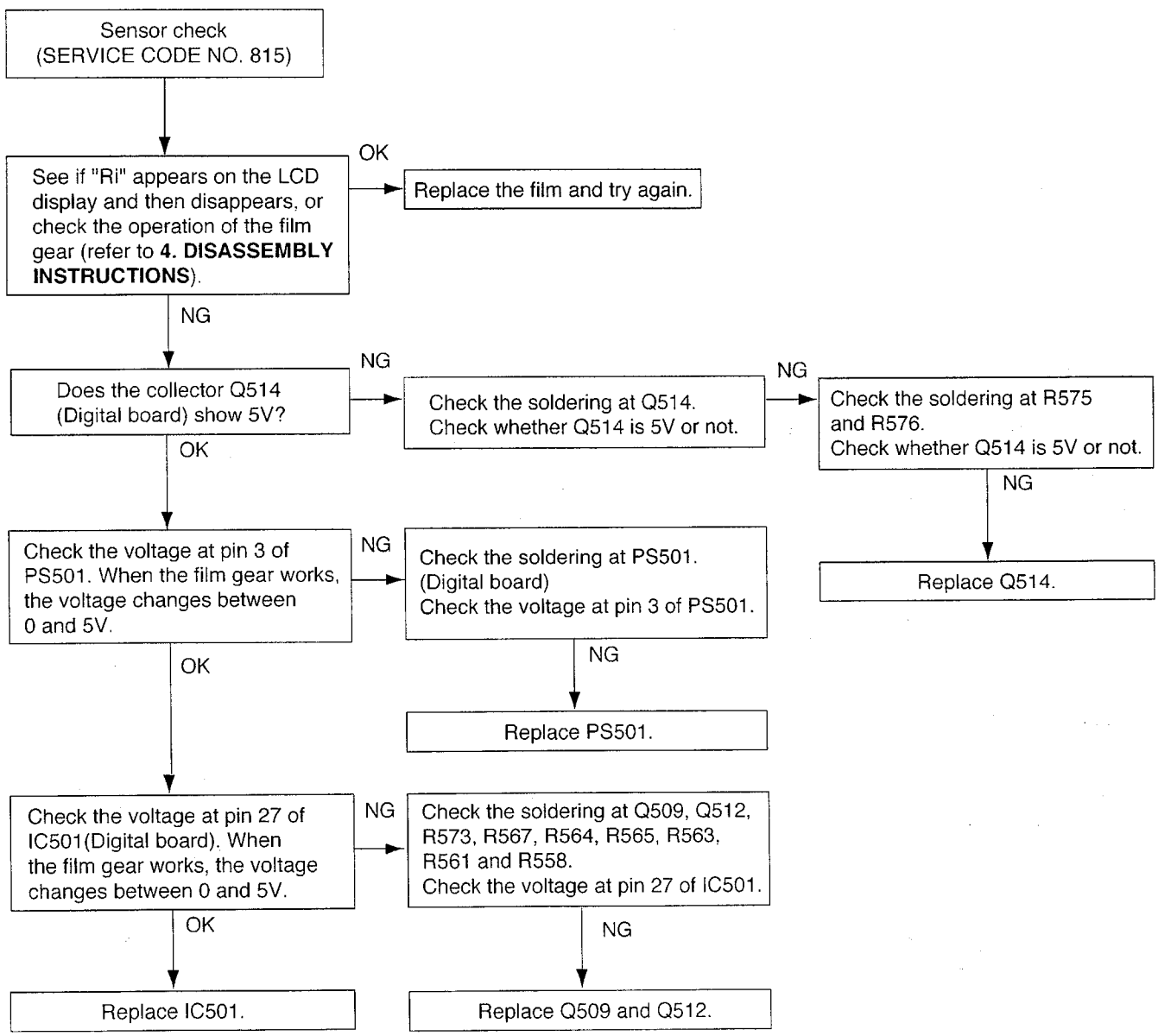
4. **Check the hook switch (SW401)**


Check the voltage at pin 21 of IC301 (Operation board).
Sensor lever released: 4 - 5 V
Sensor lever pressed: 0 V
NG
Check the soldering at R324 (Operation board). Check the voltage at pin 21 of IC301 again.
NG
Check the soldering at R323 (Operation board). Check the voltage at pin 21 of IC301 again.
NG
OK
Replace IC301.
Replace SW401.

5. **Check the paper top sensor (PS502)......"PAPER JAMMED"**

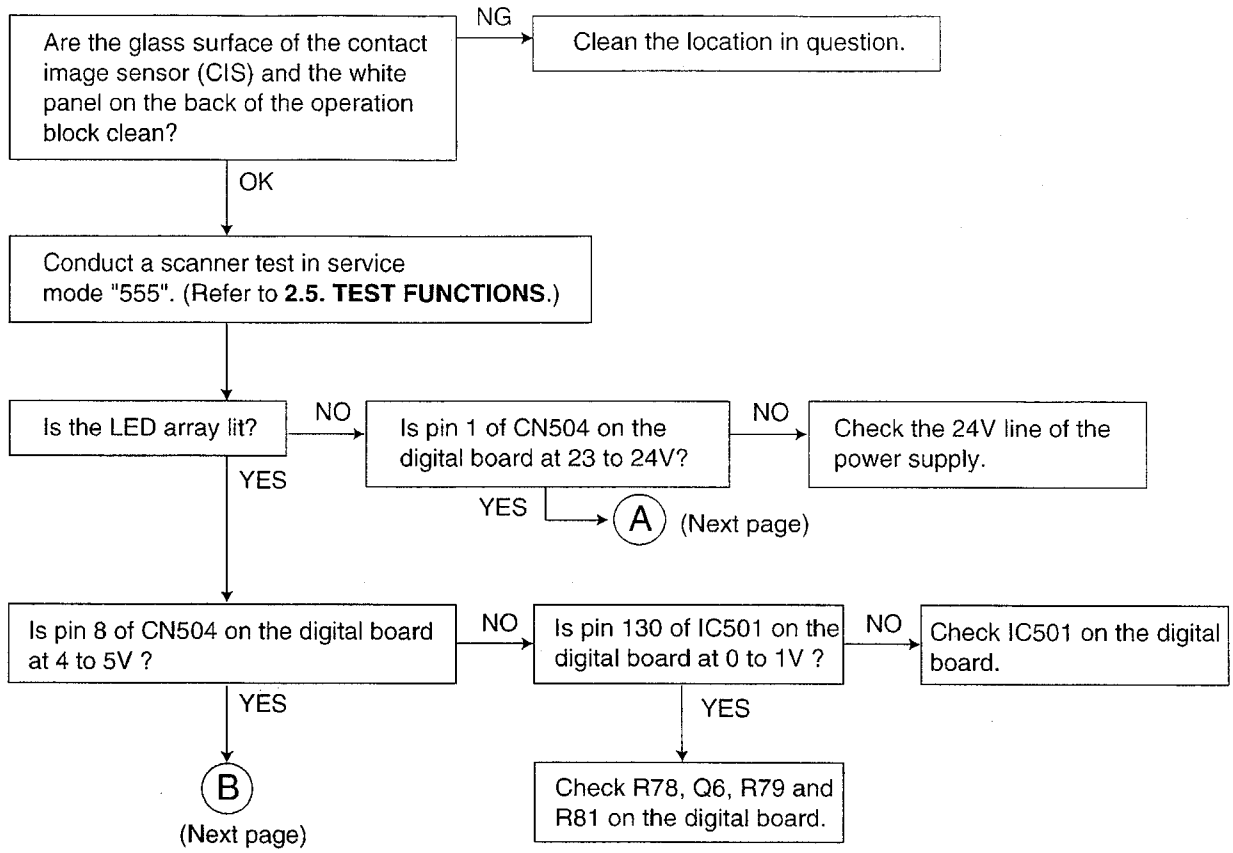

Check the voltage at pin 152 of IC501(Digital board).
When the sensor lever is pressed : 0 V
When the sensor lever is released : 4 - 5 V
When pin 129 of IC501 is low level.
NG
Check the soldering at R584 (Digital board). Check the voltage at pin 152 of IC501 again.
NG
Check the soldering at R583 (Digital board). Check the voltage at pin 152 of IC501 again.
NG
Check the soldering at R575, 576 (Digital board). Check the voltage at pin 152 of IC501 again.
NG
Replace PS502.
OK
Replace IC501.

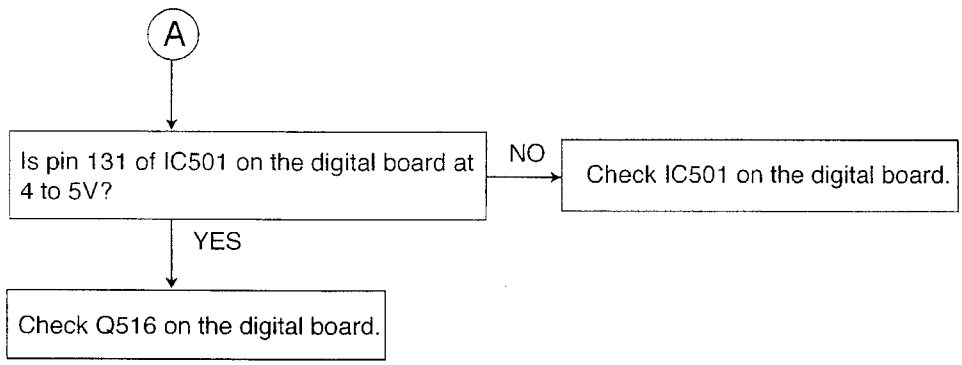
6. **Check the film end sensor (PS501)......"FILM EMPTY"**

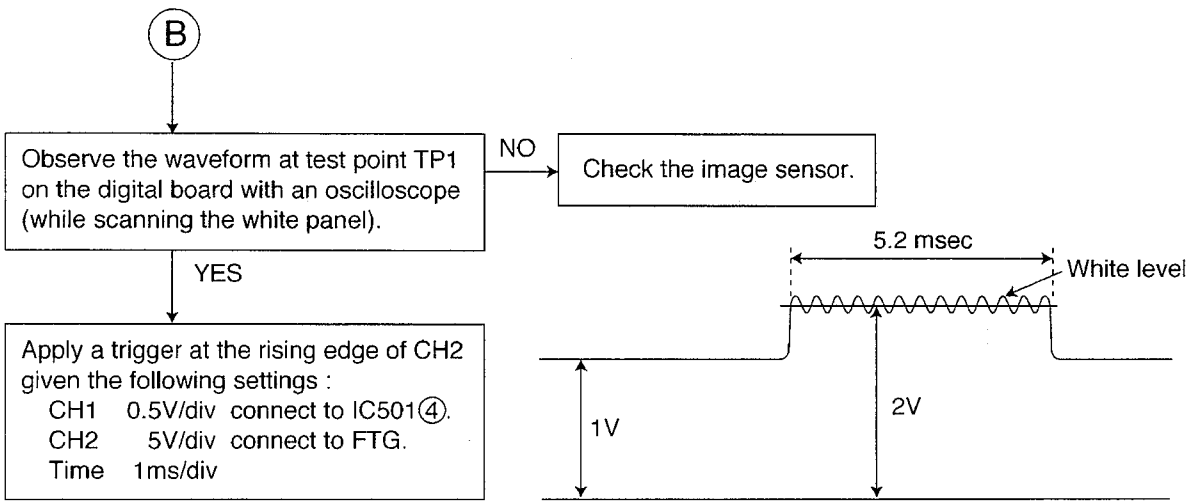

Sensor check (SERVICE CODE NO. 815)
See if "Ri" appears on the LCD display and then disappears, or check the operation of the film gear (refer to **4. DISASSEMBLY INSTRUCTIONS**).
OK
Replace the film and try again.
NG
Does the collector Q514 (Digital board) show 5V?
NG
Check the soldering at Q514. Check whether Q514 is 5V or not.
NG
Check the soldering at R575 and R576. Check whether Q514 is 5V or not.
NG
Replace Q514.
OK
Check the voltage at pin 3 of PS501. When the film gear works, the voltage changes between 0 and 5V.
NG
Check the soldering at PS501. (Digital board) Check the voltage at pin 3 of PS501.
NG
Replace PS501.
OK
Check the voltage at pin 27 of IC501(Digital board). When the film gear works, the voltage changes between 0 and 5V.
NG
Check the soldering at Q509, Q512, R573, R567, R564, R565, R563, R561 and R558. Check the voltage at pin 27 of IC501.
NG
Replace Q509 and Q512.
OK
Replace IC501.

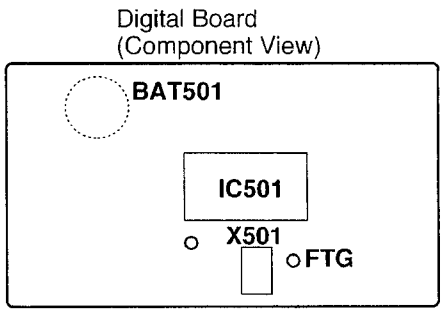
2.3.3.9. CIS (Contact Image Sensor) Section

Refer to **6.4.4. SCANNING BLOCK**.

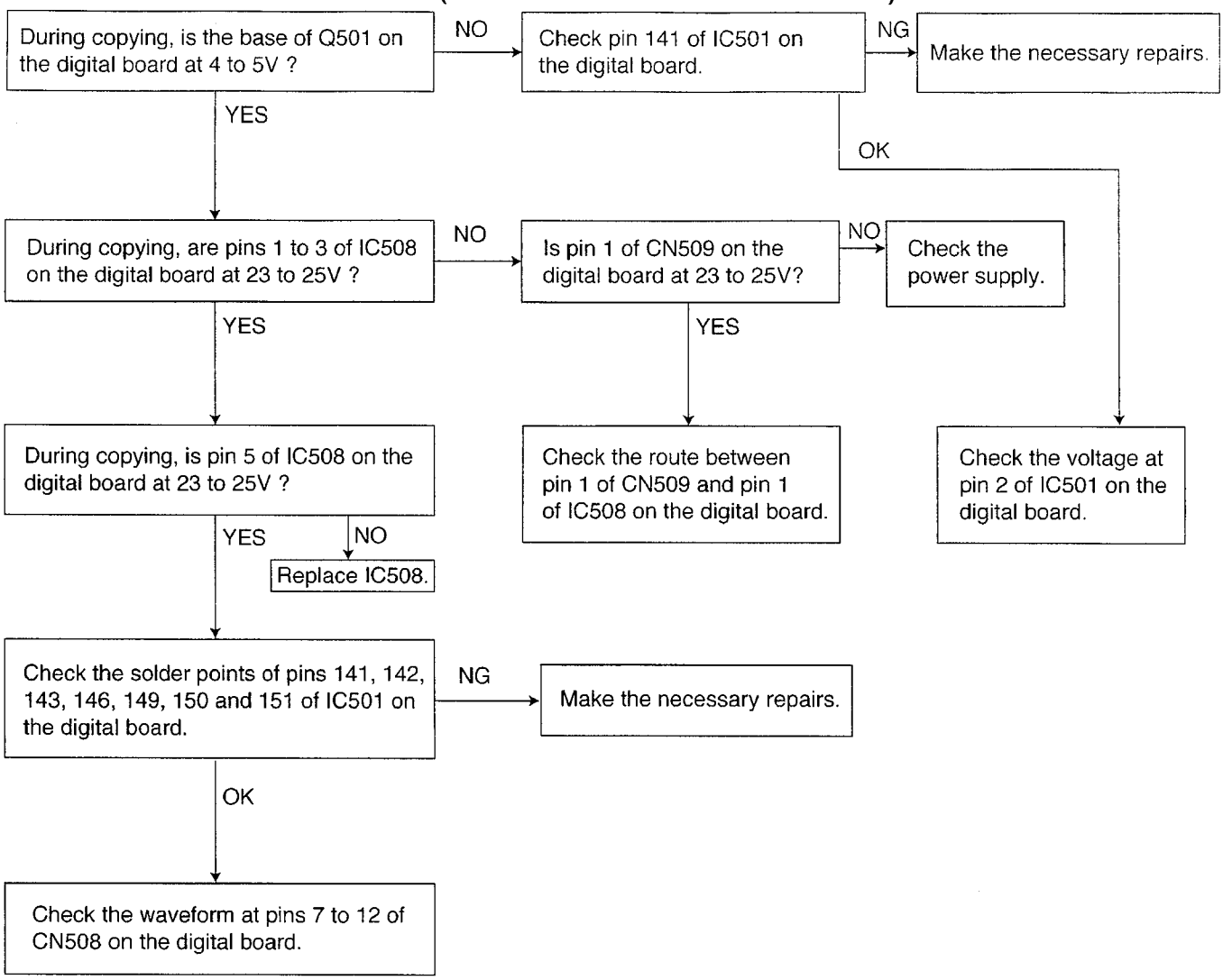

Are the glass surface of the contact image sensor (CIS) and the white panel on the back of the operation block clean?
NG
Clean the location in question.
OK
Conduct a scanner test in service mode "555". (Refer to **2.5. TEST FUNCTIONS**.)
Is the LED array lit?
NO
Is pin 1 of CN504 on the digital board at 23 to 24V?
NO
Check the 24V line of the power supply.
YES
YES
A
(Next page)
Is pin 8 of CN504 on the digital board at 4 to 5V ?
NO
Is pin 130 of IC501 on the digital board at 0 to 1V ?
NO
Check IC501 on the digital board.
YES
YES
B
(Next page)
Check R78, Q6, R79 and R81 on the digital board.


A
Is pin 131 of IC501 on the digital board at 4 to 5V?
NO
Check IC501 on the digital board.
YES
Check Q516 on the digital board.


B
Observe the waveform at test point TP1 on the digital board with an oscilloscope (while scanning the white panel).
NO
Check the image sensor.
YES
Apply a trigger at the rising edge of CH2 given the following settings :
CH1 0.5V/div connect to IC501④.
CH2 5V/div connect to FTG.
Time 1ms/div
5.2 msec
White level
1V
2V


Digital Board
(Component View)
BAT501
IC501
X501
FTG

2.3.3.10. Thermal Head Section (Refer to 6.4.3. THERMAL HEAD.)


During copying, is the base of Q501 on the digital board at 4 to 5V ?
NO
Check pin 141 of IC501 on the digital board.
NG
Make the necessary repairs.
YES
OK
During copying, are pins 1 to 3 of IC508 on the digital board at 23 to 25V ?
NO
Is pin 1 of CN509 on the digital board at 23 to 25V?
NO
Check the power supply.
YES
YES
During copying, is pin 5 of IC508 on the digital board at 23 to 25V ?
Check the route between pin 1 of CN509 and pin 1 of IC508 on the digital board.
Check the voltage at pin 2 of IC501 on the digital board.
YES
NO
Replace IC508.
Check the solder points of pins 141, 142, 143, 146, 149, 150 and 151 of IC501 on the digital board.
NG
Make the necessary repairs.
OK
Check the waveform at pins 7 to 12 of CN508 on the digital board.

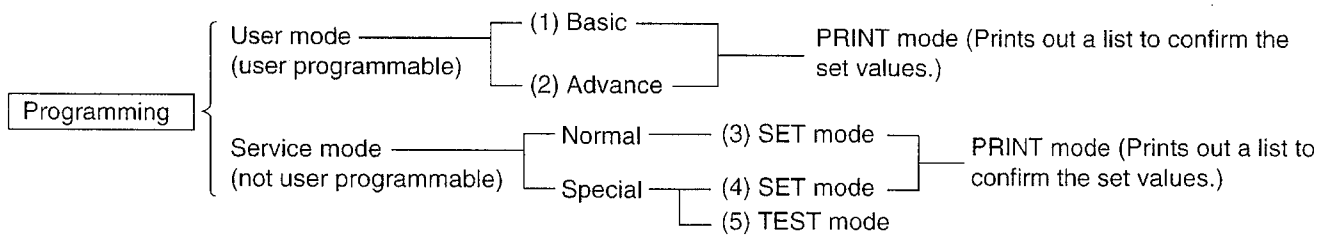
2.4. PROGRAMMING AND LISTS

The programming functions are used to program the various features and functions of the machine, and to test the machine. This facilitates communication between the user and the service man while programming the unit.

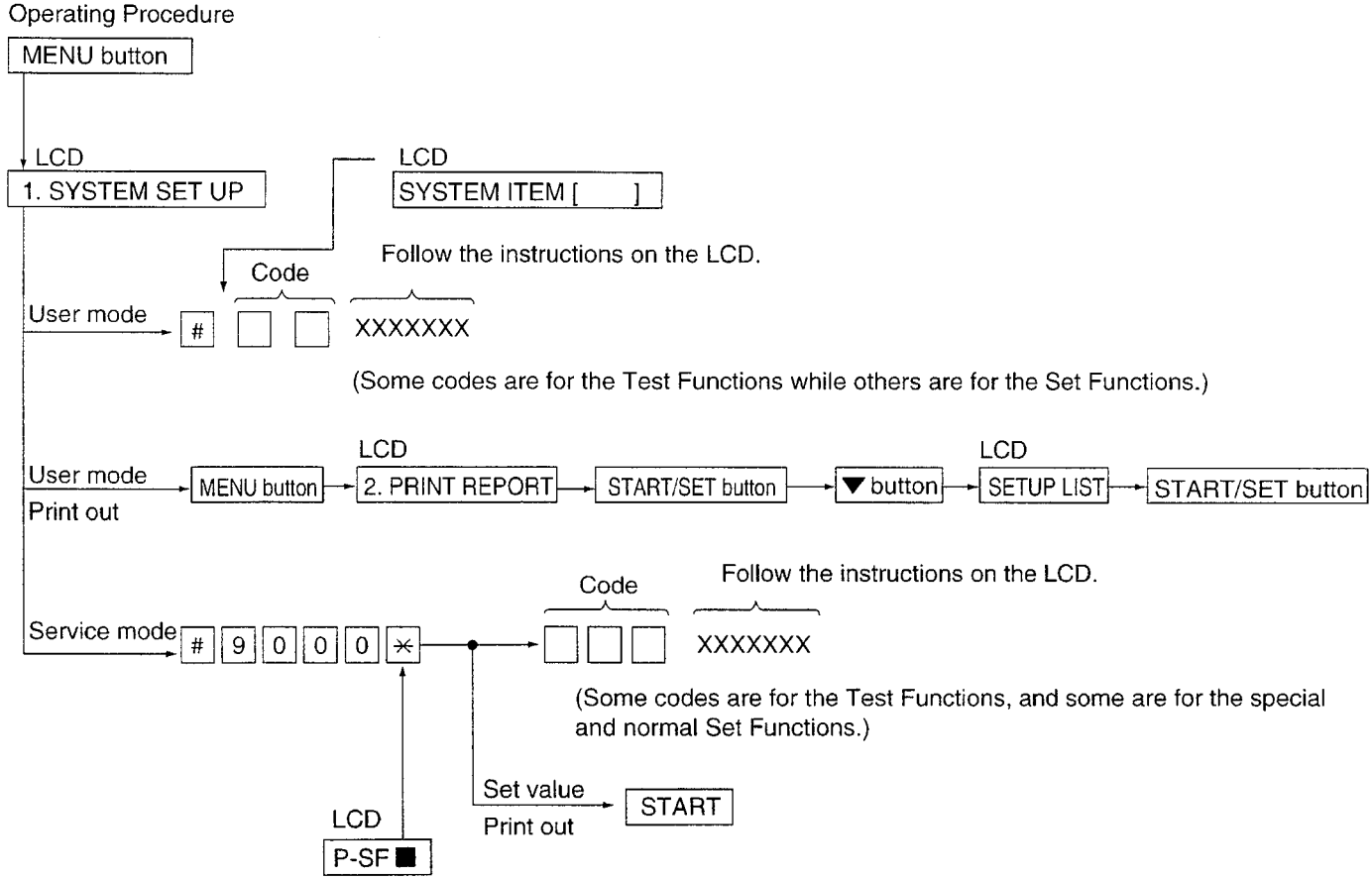
2.4.1. OPERATION

There are 2 basic categories of programming functions, the User Mode and the Service Mode. The Service Mode is further broken down into the normal and special programs. The normal programs are those listed in the Operating Instructions and are available to the user. The special programs are only those listed here and not displayed to the user. In both the User and Service Modes, there are Set Functions and Test Functions. The Set Functions are used to program various features and functions, and the Test Functions are used to test the various functions . The Set Functions are accessed by entering their code, changing the appropriate value, then pressing the SET key. The Test Functions are accessed by entering their code and pressing the key listed on the menu. While programming, to cancel any entry, press the STOP key.

2.4.2. OPERATION FLOW



Operating Procedure



2.4.3. USER MODE (The list below is an example of the SYSTEM SETUP LIST the unit prints out.)

SETUP LIST

[BASIC FEATURE LIST]

NO.	FEATURE	CURRENT SETTING	
#01	SET DATE & TIME	Jan. 01 1999 12:00AM	
#02	YOUR LOGO		
#03	YOUR FAX NUMBER		
#04	PRINT SENDING REPORT	ERROR	[ERROR,ON,OFF]
#06	TAD/FAX RING COUNT	2	[1...4,TOLL SAVER,RINGER OFF]
#10	RECORDING TIME	VOX	[VOX,1MIN]
#11	REMOTE TAD ID	ID = 111	
#13	DIALING MODE	AUTO	[AUTO,TONE,PULSE]
#18	FILM REMAIN		

Code: #01, #02, #03 — Set Value: AUTO

[ADVANCED FEATURE LIST]

NO.	FEATURE	CURRENT SETTING	
#22	JOURNAL AUTO PRINT	ON	[ON,OFF]
#23	OVERSEAS MODE	OFF	[ON,OFF]
#25	DELAYED TRANSMISSION	OFF	[ON,OFF]
	DESTINATION =		
	START TIME =	12:00AM	
#26	AUTO CALLER ID LIST	ON	[ON,OFF]
#30	SILENT FAX RECOGNITION RING	3	[3...6]
#31	RING DETECTION	OFF	[OFF,A,B,C,D]
#36	RCV REDUCTION	92%	[72,86,92,100]
#39	LCD CONTRAST	NORMAL	[NORMAL,DARKER]
#41	FAX ACTIVATION CODE	ON	[ON,OFF]
	CODE =	*9	
#42	MESSAGE ALERT	OFF	[ON,OFF]
#43	RECORDING TIME ALERT	OFF	[ON,OFF]
#44	MEMORY RECEIVE ALERT	ON	[ON,OFF]
#46	FRIENDLY RECEPTION	ON	[ON,OFF]
#47	FAX VOICE GUIDANCE	ON	[ERROR,ON,OFF]
#54	GREETING MSG. RECORDING TIME	16s	[16s,60s]

NOTE : If you change from 60sec. to 16sec. your-greeting will be erased and your new greeting will be limited to 16 seconds.

#60	MESSAGE TRANSFER	OFF	[ON,OFF]
	DESTINATION =		
#61	TRANSFER GREETING	CHECK	[CHECK,RECORD,ERASE]
#67	ICM MONITOR	ON	[ON,OFF]
#70	PAGER TRANSFER	OFF	[ON,OFF]
	DESTINATION =		
#75	IQ-FAX	OFF	[ON,OFF]
#76	CONNECTING TONE	ON	[ON,OFF]
#77	AUTO ANSWER MODE	TAD/FAX	[TAD/FAX,FAX ONLY,TEL/FAX]
#78	TEL/FAX DELAYED RING	2	[1...4]
#79	FILM DETECTION	ON	[ON,OFF]
#80	SET DEFAULT		

Code: #22, #23, #25, #26, #30, #31, #36, #39, #41, #42, #43, #44, #46, #47, #54, #60, #61, #67, #70, #75, #76, #77, #78, #79, #80 — Set Value: ON, OFF, 3, 92%, NORMAL, *9, 16s, CHECK, TAD/FAX

IF YOU HAVE A PROBLEM WITH YOUR FAX MACHINE, CALL TOLL-FREE 1-800-HELP-FAX (1-800-435-7329).

Note:

The above values are the default values.

2.4.4. SERVICE FUNCTION TABLE

Code	Function	Set Value	Effective Range	Default	Remarks
501	Pause time set	X 100 msec	001~600	50	
503	Dial speed select	1:10 pps 2:20 pps	1, 2	1	
510	VOX TIME	1:6 sec 2:4 sec	1, 2	1	
520	CED frequency select	1:2100 Hz 2:1100 Hz	1, 2	1	See the **Symptom/ Countermeasure Table** for long distance and international calls in **2.3.3.3.1. Defective facsimile section**.
521	International mode select	1:ON 2:OFF	1, 2	1	See the **Symptom/ Countermeasure Table** for long distance and international calls in **2.3.3.3.1. Defective facsimile section**.
522	Auto standby select	1:ON 2:OFF	1, 2	1	The resolution reverts to the default when transmission is complete.
523	Receive equalizer select	1:0 km 2:1.8 km 3:3.6 km 4:7.2 km	1~4	1	When the telephone station is far from the unit or reception cannot be performed correctly, adjust accordingly.
524	Transmission equalizer select	1:0 km 2:1.8 km 3:3.6 km 4:7.2 km	1~4	1	When the telephone station is far from the unit or transmission cannot be performed correctly, adjust accordingly.
533	Setting the number of times that massage transfer is redialed.	00~99	00~99	30	Selects the number of times that message transfer is redialed (not including the first dialing).
534	Setting the message transfer/pager call redial interval	001~999 sec	001~999	30	Sets the interval of message transfer/pager call redial.
550	Memory clear: To reset the value to the default one, except the top margin (853) and left margin (854).				"START" input"
552	DTMF single tone test	1:ON 2:OFF	1, 2	2	See **2.5. TEST FUNCTIONS**.
553	Monitor on FAX communication select	1: OFF 2:PHASE B 3:ALL	1~3	1	
554	Modem test				See **2.5. TEST FUNCTIONS**.
555	Scan check				See **2.5. TEST FUNCTIONS**.
556	Motor test			0	See **2.5. TEST FUNCTIONS**.
557	LED test				See **2.5. TEST FUNCTIONS**.
558	LCD test				See **2.5. TEST FUNCTIONS**.
559	Document jam detection select	1:ON 2:OFF	1, 2	1	See **2.2.1. Paper Jam**.
561	KEY test				See **2.5. TEST FUNCTIONS**.
570	BREAK % select	1:61% 2:67%	1, 2	1	Sets the % break of pulse dialing according PBX.
571	ITS auto redial time set	X number of times	00~99	14	Selects the number of times that ITS is redialed (not including the first dial).
572	ITS auto redial line disconnection time set	X second	001~999	30	Sets the interval of ITS redialing.
573	Remote turn-on ring number set	X number of rings	01~99	15	Sets the number of rings before the unit starts to receive a document in the TEL mode.
580	TAM continuous tone detection	1:ON 2:OFF	1, 2	1	ON : Stops TAM operation when Dial tone, etc. are detected.
590	FAX auto redial time set	X number of times	00~99	5	Selects the number of redial times during FAX communication (not including the first dial).
591	FAX auto redial time disconnection time set	X second	001~999	45	Sets the FAX redial interval during FAX communication.
592	CNG transmit select	1: OFF 2:ALL 3:AUTO	1~3	2	Lets you select the CNG output during FAX transmission. ALL: CNG is output at phase A. AUTO: CNG is output only when automatic dialing is performed. OFF: CNG is not output at phase A.
593	Time between CED and 300bps	1: 75 msec 2:500 msec 3:1 sec	1~3	1	See the Symptom/Countermeasure Table for long distance and international calls in **2.3.3.3.1. Defective facsimile section**.
594	Overseas DIS detection select	1:detects at the 1st time 2:detects at the 2nd time	1, 2	1	See the Symptom/Countermeasure Table for long distance and international calls in **2.3.3.3.1. Defective facsimile section**.

Code	Function	Set Value	Effective Range	Default	Remarks
595	Receive error limit value set	X Number of times	001~999	100	Sets the number of acceptable error lines when the FAX reconstructs the received data.
596	Transmit level set	X dBm	- 15~00	10	Selects the FAX transmission level.
598	Receiving sensitivity	43= -43 dBm	20~48	43	Used when there is an error problem. See the Symptom/Countermeasure Table for long distance and international calls in **2.3.3.3.1. Defective facsimile section**.
602	Warning LIST Printing	1:ON 2:OFF	1, 2	1	Used to print a caution list when setting the TEL/FAX mode and ring detection.
717	Transmit speed selection	1:14400BPS 2:12000BPS 3:9600BPS 4:7200BPS 5:4800BPS 6:2400BPS	1~6	1	Adjusts the speed to start training during FAX transmission.
718	Receive speed selection	1:14400BPS 2:12000BPS 3:9600BPS 4:7200BPS 5:4800BPS 6:2400BPS	1~6	1	Adjusts the speed to start training during FAX reception.
719	Ringer off in TEL/FAX mode	1:ON 2:OFF	1, 2	1	Sets the ringer switch off when a call is received in the TEL/FAX mode.
721	Pause tone detect	1:ON 2:OFF	1, 2	1	Selects the tone detection for pause in dialing.
722	Redial tone detect	1:ON 2:OFF	1, 2	1	Selects the tone detection mode after redialing.
731	CPC mode	1:A 2:B 3:OFF	1~3	1	Sets the CPC signal detection mode from the converter
732	AUTO disconnect cancel time	1:350 ms 2:1.8 sec 3:OFF	1~3	1	"Sets to "2" when the auto disconnect circuit operates and cuts the line."
745	Poewr ON film feed	1:ON 2:OFF	1, 2	1	When the power is turned on, the film is wound to take up any slack.
763	CNG detect time for friendly reception	1:10 sec 2:20 sec 3:30 sec	1~3	3	Selects the CNG detection tome of friendly reception.
771	T1 timer	1:35 sec 2.ð0 sec	1, 2	1	Sets a higher value when the response from the other party needs more time during FAX transmission.
775	Monitoring of message transfer	1:ON 2:OFF	1, 2	2	If set to ON a message can be monitored from this unit's SP-PHONE when transferring a message.
784	Voice prompt test				You can hear the voice prompt from speaker after pressing "START" key.
815	Sensor & Vox check				See **2.5. TEST FUNCTIONS**.
841	Digital SP-phone check				See **2.3.3.5.1. Digital Speakerphone**.
852	Print test pattern				See **2.5. TEST FUNCTIONS**.
853	Top margin		1~9	--------	
854	Left margin		1~8	--------	
861	A4 size set	1:ON 2:OFF	1, 2	2	Used only at the factory.
880	History list				See **2.4.6. HISTORY**.
881	Journal 2 list				See **2.4.7.3. PRINTOUT EXAMPLE**.
882	Journal 3 list				See **2.4.7.3. PRINTOUT EXAMPLE**.
890	TEL/FAX 1st ring back tone	1:ON 2:OFF	1, 2	1	Selects whether the TEL/FAX 1st ring back tone is ON or OFF in the TEL/FAX mode.
895	TEL/FAX mode receiving mode setting after bell time out	1:TAD 2:FAX	1, 2	2	

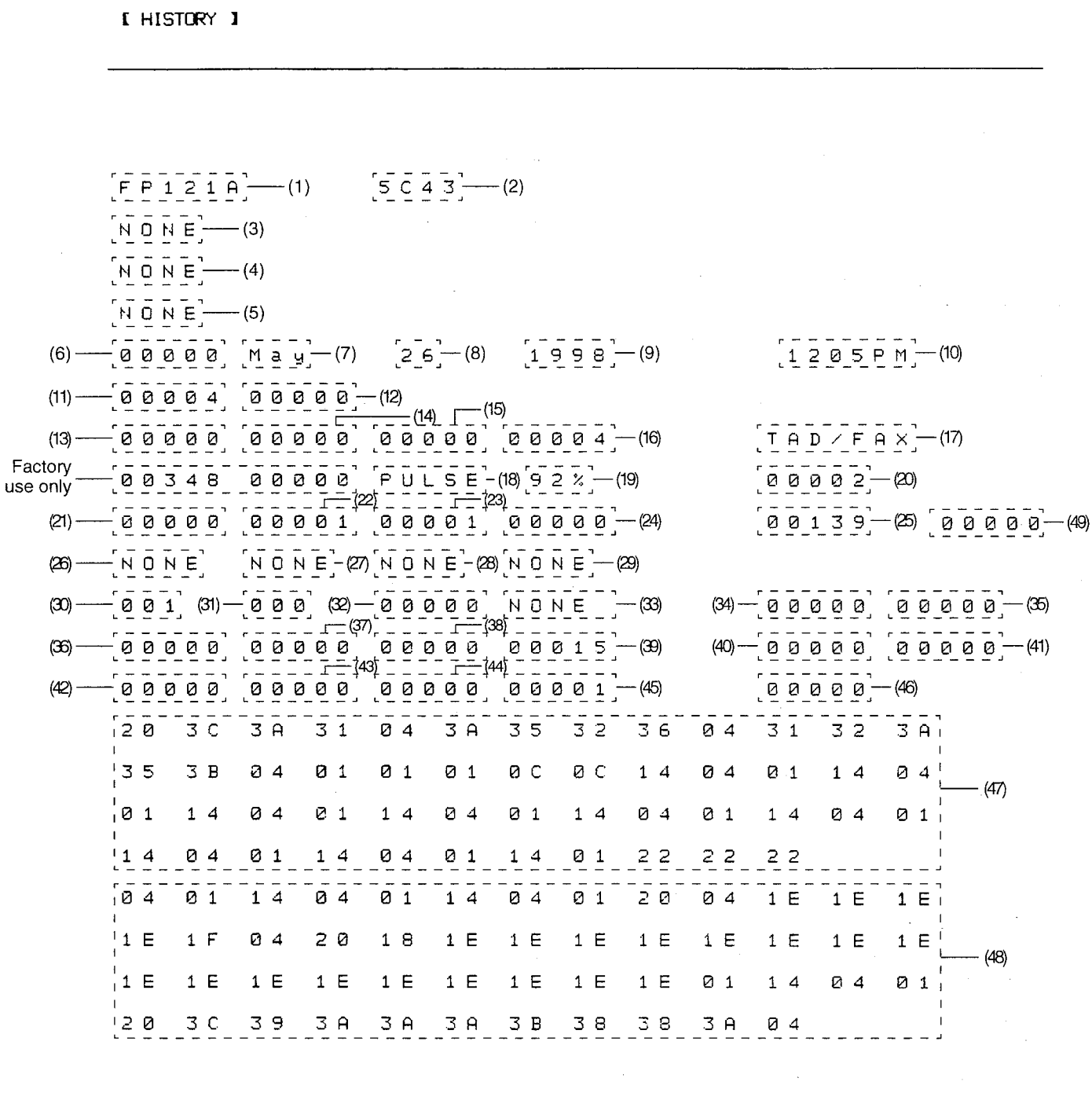
2.4.5. SERVICE MODE SETTINGS (Example of a printed out list)

```
[ SERVICE DATA LIST ]
   Code                                  Set Value
501 PAUSE TIME                 =  050*100ms          [001...600]*100ms
503 DIAL SPEED                 =  10pps              [1=10     2=20]pps
510 VOX TIME                   =  6sec               [1=6      2=4]sec
520 CED FREQ.                  =  2100Hz             [1=2100   2=1100]Hz
521 INTL. MODE                 =  ON                 [1=ON     2=OFF]
522 AUTO STANDBY               =  ON                 [1=ON     2=OFF]
523 RX EQL.                    =  0.0Km              [1=0.0    2=1.8   3=3.6   4=7.2]Km
524 TX EQL.                    =  0.0Km              [1=0.0    2=1.8   3=3.6   4=7.2]Km
853 TOP MARGIN                 =  5                  [1...9]
854 LEFT MARGIN                =  5                  [1...8]

[ SPECIAL SERVICE SETTINGS ]

 533   534   552   553   559   570   571   572   573   580   590   591   592   591
  03   030     2     1     1     1    14   030    15     1    05   045     2   045
Code  Set Value
 593   594   595   596   598   602   717   718   719   721   722   731   732   731
   1     1   100    10    43     1     1     1     1     1     1     1     1     1

 745   763   771   775   861   890   895
   1     3     1     2     2     1     2

USAGE TIME = 00024 HOURS
```

Note:

The above values are the default values.

2.4.6. HISTORY



Note:

See the following descriptions of this report. Item No. (1) ~ (49) are corresponding to the listed items in **2.4.6.1. Descriptions of the HISTORY Report**.

2.4.6.1. Descriptions of the HISTORY Report

(1) ROM VERSION

EPROM version

(2) SUM

EPROM internal data calculation.

(3) YOUR LOGO

The user logo recorded in the unit. If it is not recorded, NONE will be displayed.

(4) YOUR TELEPHONE NUMBER

The user telephone number recorded in the unit. If it is not recorded, NONE will be displayed.

(5) FAX PAGER NUMBER

If you program a pager number into the unit, the pager number will be displayed here.

(6) FACTORY - CUSTOMER

This shows how many days from factory production until the user turns ON the unit.

(7) MONTH

The shows the very first month, date, year and time set by the user after they purchased the unit.

(8) DAY

The shows the very first month, date, year and time set by the user after they purchased the unit.

(9) YEAR

The shows the very first month, date, year and time set by the user after they purchased the unit.

(10) TIME

The shows the very first month, date, year and time set by the user after they purchased the unit.

(11) USAGE TIME

The amount of time the unit has been powered ON.

(12) FACTORY - NOW

This shows how many days from factory production until the user prints out this history list.

(13) TEL MODE

The amount of time the TEL mode setting was used.

(14) FAX MODE

The amount of time the FAX mode setting was used.

(15) TEL/FAX MODE

The amount of time the TEL/FAX mode setting was used.

(16) ANS/FAX MODE

The amount of time the ANS/FAX mode setting was used.

(17) FINAL RECEIVE MODE

The last set receiving mode by the user.

(18) TONE/PULSE SELECTION

The most recently used setting used, either TONE or PULSE.

(19) RECEIVE REDUCTION

The compression rate when receiving.

(20) SETTING NO. OF DIRECTORY

The recorded directory stations (one touch and JOG DIAL).

(21) NUMBER OF COPY

The number of pages copied.

(22) NUMBER OF RECEIVE

The number of pages received.

(23) NUMBER OF SENDING

The number of pages sent.

(24) NUMBER OF CALLER ID

The number of times Caller ID was received.

(25) NUMBER OF RECORDING MESSAGE

The number of messages recorded in TAM.

(26) NUMBER OF PC SCAN

The number of times multifunction was used for the Scanner. (The number of pages scanned. If the unit does not have a PC interface, NONE will be printed.)

(27) NUMBER OF PC-PRINT

The number of times multifunction was used for the Printer. (The number of pages printed. If the unit does not have a PC interface, NONE will be printed.)

(28) NUMBER OF RECEIVING TO PC

The number of times received in the PC through the FAX serial interface (RS232C). (The number of pages received. If the unit does not have a PC interface, NONE will be printed.)

(29) NUMBER OF SENDING FROM PC

The number of times transmitted from the PC through the FAX serial interface (RS232C). (The number of pages transmitted. If the unit does not have a PC interface, NONE will be printed.)

(30) NUMBER OF PRINTING WARNING LIST

The number of warning lists printed until now.

(31) NUMBER OF PRINTING HELP

The number of help lists printed until now.

(32) NUMBER OF DIVIDED PRINTING IN FAX RECEPTION

The number of faxes received that were divided into more than one sheet since the unit was purchased.

(33) DETECTION OF RS232C

When the fax and PC serial cable (RS232C) are connected and the signal is received correctly, COMPLETE will be printed. For models without a PC interface or when there is a PC interface but the signal cannot be received between the fax and PC, INCOMPLETE will be printed. (The number of pages transmitted. If the unit does not have a PC interface, NONE will be printed.)

(34) NO. OF IQ-FAX LOADING -OK:

(35) NO. OF IQ-FAX LOADING -NG:

You may not be able to use IQ-FAX if the special subscriber information is not loaded from the IQ-FAX center before use. Depending on the conditions of the communication line, it may not be completed in one time, so RETRIED will be performed. The number of OK and NG IQ-FAX loadings will be printed.

(36) FAX MODE

Means the unit received a fax message in the FAX mode.

(37) MAN RCV

Means the unit received a fax message by manual operation.

(38) FRN RCV

Means the unit received a fax message by friendly signal detection.

(39) VOX

Means the unit detected silence or no voice.

(40) RMT DTMF

Means the unit detected DTMF (Remote Fax activation code) entered remotely.

(41) PAL DTMF

Means the unit detected DTMF (Remote Fax activation code) entered by a parallel connected telephone.

(42) TURN-ON

Means the unit started to receive after 15 rings. (Remote Turn On: Service Code #573)

(43) TIME OUT

Means the unit started to receive after Ring Time Out in the EXT-TAM or TEL/FAX mode.

(44) IDENT

Means the unit detected Ring Detection.

(45) CNG OGM

Means the unit detected the CNG while it was sending the Dummy Ring Back Tone in the TEL/FAX mode, or while answering a call in the EXT-TAM mode. Or means the unit detected the CNG while it was sending the OGM in the ANS/FAX mode.

(46) CNG ICM

Means the unit detected the CNG while it was recording the ICM in the ANS/FAX mode.

KX-FP121

(47) KEY OPERATION -1st 50:

(48) KEY OPERATION -Last 50:

Indicates 2-digit codes. Refer to **2.5.2. BUTTON CODE TABLE**.

- 1st 50:

  History of the first 50 key operations after purchase.

  (Ex.) If the MENU, # and 9 buttons are pressed, 20, 3C and 39 will be printed.

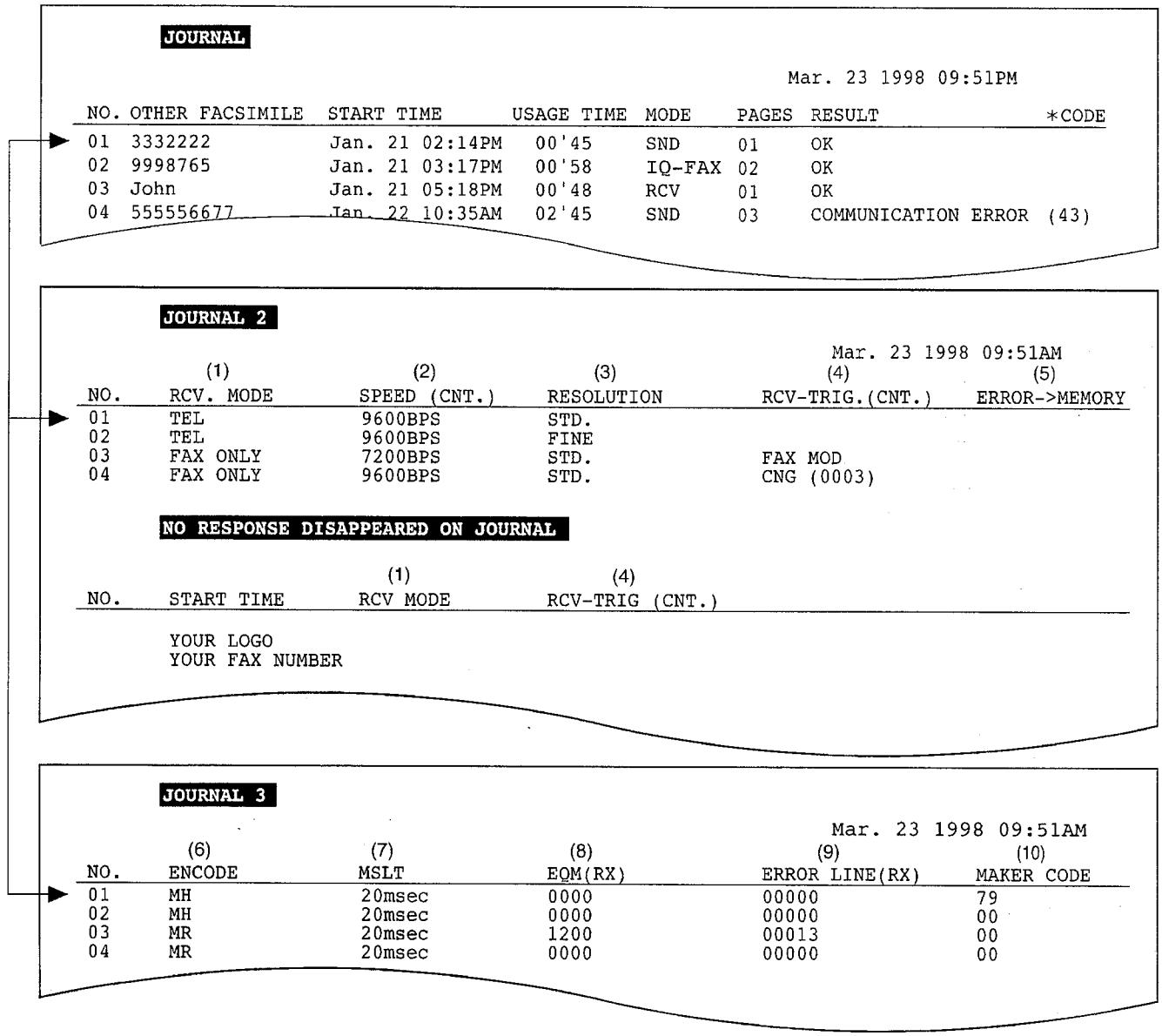
- Last 50:

  History of the last 50 key operations.

(49) NUMBER OF IQ-FAX PAGES TRANSMITTED

2.4.7. SPECIAL SERVICE JOURNAL REPORTS

Journal 2 and Journal 3 shown below, which are special journals giving the additional detailed information about the latest 35 communications, can be printed by Service Code 881 or 882. Remote printing function for the journal reports (JOURNAL, JOURNAL 2 and JOURNAL 3) is also available for service technicians. (Refer to **2.3.3.3.2. Remote programming**.) The JOURNAL report only gives you basic information about a communication, but the other two journal reports provide different information on the same item (communication).



JOURNAL

Mar. 23 1998 09:51PM

NO.	OTHER FACSIMILE	START TIME	USAGE TIME	MODE	PAGES	RESULT	*CODE
01	3332222	Jan. 21 02:14PM	00'45	SND	01	OK	
02	9998765	Jan. 21 03:17PM	00'58	IQ-FAX	02	OK	
03	John	Jan. 21 05:18PM	00'48	RCV	01	OK	
04	555556677	Jan. 22 10:35AM	02'45	SND	03	COMMUNICATION ERROR	(43)

JOURNAL 2

Mar. 23 1998 09:51AM

NO.	(1) RCV. MODE	(2) SPEED (CNT.)	(3) RESOLUTION	(4) RCV-TRIG.(CNT.)	(5) ERROR->MEMORY
01	TEL	9600BPS	STD.		
02	TEL	9600BPS	FINE		
03	FAX ONLY	7200BPS	STD.	FAX MOD	
04	FAX ONLY	9600BPS	STD.	CNG (0003)	

NO RESPONSE DISAPPEARED ON JOURNAL

NO.	(1) START TIME	RCV MODE	(4) RCV-TRIG (CNT.)

YOUR LOGO
YOUR FAX NUMBER

JOURNAL 3

Mar. 23 1998 09:51AM

NO.	(6) ENCODE	(7) MSLT	(8) EQM(RX)	(9) ERROR LINE(RX)	(10) MAKER CODE
01	MH	20msec	0000	00000	79
02	MH	20msec	0000	00000	00
03	MR	20msec	1200	00013	00
04	MR	20msec	0000	00000	00

HOW TO READ JOURNAL REPORTS:

Example:

1. Look at **NO. 01** in the JOURNAL. If you want to know about the details about that item, see **NO. 01** in the JOURNAL 2 and the JOURNAL 3. You can get the following information.
   * MODE: Fax transmission
   * RCV. MODE: TEL
   * TX SPEED: 9.6 kbps
   * RESOLUTION: standard
   * ENCODE: MH
   * MAKER CODE: 79
2. Look at **NO. 04** in the JOURNAL 2. CNG (0003) indicates that the CNG signal has been received three times since the purchase date.

For further details, see **2.4.7.1. JOURNAL 2** and **2.4.7.2. JOURNAL 3**.

2.4.7.1. JOURNAL 2 (Refer to JOURNAL 2 in 2.4.7.3. PRINTOUT EXAMPLE.)

Journal 2 displays the additional detailed information about the last 35 communications.

Descriptions:

(1) RCV. MODE

Indicates which receive mode the unit was in when the unit received a fax message.

This information is also displayed when the unit transmitted a fax message.

(2) SPEED

Indicates the speed of the communication. If multiple pages are transmitted or received, it indicates the last page's communication speed. If there is a communication error, "?" is displayed.

(3) RESOLUTION

Indicates the resolution of the communication. If multiple pages are transmitted or received, it indicates the last page's resolution. If there is a communication error, "?" is displayed.

(4) RCV-TRIG. (CNT.)

Indicates the trigger that causes the unit to switch to the fax receive mode. The available options are listed in JOURNAL 2 in **2.4.7.3. PRINTOUT EXAMPLE**. The values in parentheses indicate how many times the trigger has been used. (For example, "0003" means three times.)

No.	Display	Function
1	FAX MODE	Means the unit received a fax message in the FAX mode.
2	MAN RCV	Means the unit received a fax message by manual operation.
3	FRN RCV	Means the unit received a fax message by friendly signal detection.
4	VOX	Means the unit detected silence or no voice.
5	RMT DTMF	Means the unit detected DTMF (Remote Fax activation code) entered remotely.
6	PAL DTMF	Means the unit detected DTMF (Remote Fax activation code) entered by a parallel connected telephone.
7	TURN-ON	Means the unit started to receive after 15 rings. (Remote Turn On: Service Code #573)
8	TIME OUT	Means the unit started to receive after Ring Time Out in the EXT-TAM or TEL/FAX mode.
9	IDENT	Means the unit detected Ring Detection.
10	CNG OGM	Means the unit detected the CNG while it was sending the Dummy Ring Back Tone in the TEL/FAX mode. OR Means the unit detected the CNG while it was sending the OGM in the ANS/FAX mode.
11	CNG ICM	Means the unit detected the CNG while it was recording the ICM in the ANS/FAX mode.

(5) ERROR→MEMORY

Indicates the reason why the unit received a fax message in memory.

If you look at No.11 in the JOURNAL 2 in **2.4.7.3. PRINTOUT EXAMPLE**, it shows the fax message was received in memory due to "PAPER OUT" error.

NO RESPONSE DISAPPEARED ON JOURNAL

The "**NO RESPONSE DISAPPEARED ON JOURNAL**" displays the information about the last 10 communications terminated by "No Response". (Some of the communications terminated by "No Response" were not displayed in the JOURNAL.)

When a fax transmission cannot be performed because the ohter party's unit is set to the TEL mode, "No response" will be printed.

2.4.7.2. JOURNAL 3 (Refer to JOURNAL 3 in 2.4.7.3. PRINTOUT EXAMPLE.)

Descriptions:

(6) ENCODE

Compression Code : MH/MR

(7) MSLT

MSLT means Minimum Scan Line Time. Used only at the factory.

(8) EQM

EQM means Eye Quality Monitor. Used only at the factory.

(9) ERROR LINE(RX)

When an error occurs while receiving a fax, this shows the number of error lines.

(10) MAKER CODE

This shows a 2 digit code of the other party's fax machine brand.

0E: "KX" model
00: Unknown
79: "UF" model
19: "Zerox" model

2.4.7.3. PRINTOUT EXAMPLE

JOURNAL2

Mar. 25 1998 01:59PM

NO.	RCV. MODE	SPEED (CNT.)	RESOLUTION	RCV-TRIG. (CNT.)	ERROR->MEMORY
01	FAX ONLY	9600BPS	FINE.	FAX MOD	
02	FAX ONLY	9600BPS	STD.	FAX MOD	
03	FAX ONLY	9600BPS	FINE.		
04	FAX ONLY	9600BPS	FINE.	FAX MOD	
05	FAX ONLY	9600BPS	FINE.	FAX MOD	
06	FAX ONLY	9600BPS	FINE.	FAX MOD	
07	FAX ONLY	9600BPS	FINE.		
08	FAX ONLY	9600BPS	FINE.		
09	FAX ONLY	9600BPS	FINE.		
10	FAX ONLY	9600BPS	STD.	FAX MOD	
11	FAX ONLY	9600BPS	FINE.	FAX MOD	PAPER OUT
12	FAX ONLY	9600BPS	STD.	FAX MOD	
13	FAX ONLY	9600BPS	STD.		
14	FAX ONLY	?	?		
15	FAX ONLY	?	?		
16	FAX ONLY	?	?		
17	FAX ONLY	9600BPS	STD.		
18	FAX ONLY	9600BPS	FINE.	FAX MOD	
19	FAX ONLY	9600BPS	STD.	FAX MOD	
20	FAX ONLY	9600BPS	S-FINE.		
21	FAX ONLY	9600BPS	FINE.		
22	FAX ONLY	9600BPS	FINE.	FAX MOD	
23	FAX ONLY	?	?	FAX MOD	
24	FAX ONLY	9600BPS	STD.	FAX MOD	
25	FAX ONLY	9600BPS	STD.	FAX MOD	
26	FAX ONLY	9600BPS	FINE.	FAX MOD	
27	FAX ONLY	9600BPS	FINE.		
28	FAX ONLY	9600BPS	STD.	FAX MOD	
29	FAX ONLY	9600BPS	FINE.	FAX MOD	
30	FAX ONLY	9600BPS	S-FINE.	FAX MOD	
31	FAX ONLY	9600BPS	STD.	FAX MOD	
32	FAX ONLY	9600BPS	STD.	FAX MOD	
33	FAX ONLY	?	?	FAX MOD	
34	FAX ONLY	9600BPS	STD.	FAX MOD	
35	FAX ONLY	9600BPS	STD.	FAX MOD	

NO RESPONSE DISAPPEARED ON JOURNAL

NO.	START TIME	RCV MODE	RCV-TRIG. (CNT.)

JOURNAL 3

Mar. 25 1998 01:58PM

NO.	ENCODE	MSLT	EOM(RX)	ERROR LINE(RX)	MAKER CODE
01	MR	10msec	007A	00000	0E
02	MR	20msec	016B	00000	00
03	MH	10msec	0000	00000	00
04	MR	20msec	019B	00003	00
05	MR	20msec	0156	00011	00
06	MR	20msec	0113	00000	00
07	MR	5msec	0000	00000	79
08	MR	5msec	0000	00000	79
09	MR	0msec	0000	00000	19
10	MR	20msec	0100	00000	00
11	MR	10msec	0073	00000	0E
12	MR	20msec	012B	00000	00
13	MH	20msec	0000	00000	79
14	MH	20msec	0000	00000	00
15	MH	20msec	0000	00000	00
16	MH	20msec	0000	00000	00
17	MR	5msec	0000	00000	79
18	MR	10msec	00AB	00004	0E
19	MR	20msec	0124	00000	00
20	MR	20msec	0000	00000	00
21	MR	20msec	0000	00000	00
22	MR	20msec	0135	00000	00
23	MR	20msec	0000	00000	00
24	MR	20msec	01BC	00000	00
25	MR	20msec	01AC	00000	00
26	MR	20msec	020F	00000	00
27	MR	10msec	0000	00000	0E
28	MR	20msec	01DF	00000	00
29	MR	20msec	01EA	00000	00
30	MR	20msec	00CD	00000	00
31	MR	20msec	02F8	00000	0E
32	MR	10msec	04F8	00000	0E
33	MR	10msec	0000	00000	00
34	MR	20msec	03B6	00000	0E
35	MH	20msec	00E0	00000	00

2.5. TEST FUNCTIONS

The codes listed below can be used to perform simple checks of some of the unit's functions. When complaints are received from customers, they provide an effective tool for identifying the locations and causes of malfunctions.

Test mode	Type of Mode	Code □□□ Operation after code input	Function
MOTOR TEST	Service Mode	5 5 6 START	Rotates the transmission and reception motor to check the operation of the motor. 13 ... FAX TX/Reading memory 14 ... Document feed 23 ... Recording paper is fed 33 ... List/FAX RX print, pull back recording paper 43 ... Copy 05 ... Recording paper feed (Test a recording paper feeding operation by shifting from 23 to 33.) • Press the STOP button to quit.
MODEM TEST	Service Mode	5 5 4 START	First, go to the OFF-HOOK status with the handset to enter this Test Mode. Each time you press the start key, each of the signals will be heard in the following order from the handset. 1) OFF → 2) 14400bps → 3) 12000bps → 4) 9600bps (V17) → 5) 7200bps (V17) → 6) 9600bps → 7) 7200bps → 8) 4800bps → 9) 2400bps → 10) 300bps →11) 2100Hz →12) 1100Hz
ROM CHECK	Service Mode	5 5 1 START	Indicates the version and check sum of the ROM.
SCAN CHECK	Service Mode	5 5 5 START	Turns on the LEDs of the CIS unit and operates the read system.
LCD CHECK	Service Mode	5 5 8 START	Checks the LCD indication. Illuminates all the dots to check if they are normal.
DTMF SINGLE TEST	Service Mode	5 5 2 1..On 2..Off	Outputs DTMF as single tones. Used to check the frequencies of the individual DTMF tones. Refer to **2.5.1. DTMF Single Tone Transmit Selection**.
LED TEST	Service Mode	5 5 7 START	All LEDs above the operation panel board flash on and off, or are illuminated.
KEY CHECK	Service Mode	5 6 1 START {any key}	Checks the button operation. Indicates the button code on the LCD while the button is pressed. Refer to **2.5.2 Button Code Table**.
FACTORY SET	Service Mode	5 5 0 START	Clears the memory where the user can store data.
PRINT TEST PATTERN	Service Mode	8 5 2 START	Prints out the test pattern. Used mainly at the factory to test the print quality. You can select 1~4. (See **2.5.3. PRINT TEST PATTERN**.)
DIGITAL SPEAKERPHONE RX & TX CHECK	Service Mode	8 4 1 SPEAKERPHONE	Please refer to **2.3.3.5.1. Digital Speakerphone**.

Test mode	Type of Mode	Code □□□ Operation after code input	Function
SENSOR CHECK & VOX CHECK	Service Mode	8 1 5 START LCD display Do Sn Co Pt Ri Vx	If you enter this mode and operate sensor levers with your hands, the LCD display of the related sensor (or switch) turns ON/OFF. Also, when copying a document, the related sensor will turn ON/OFF. (Do, Sn, Pl, Pt, Ri) For each sensor's operation, refer to **6.5. SENSORS AND SWITCHES**. Do: Document set sensor: Paper inserted. Turns on when a document is inserted. Sn: Read position sensor: At the read position. Turns on when the front cover is opened and the sensor lever is pressed directly. Co: Cover open sensor: Cover open. Turns on and off when the front cover is opened and closed. Pt: Paper top sensor: Sensor on. Turns on when the front cover is opened and the sensor lever is pressed directly. Ri: Film and sensor: Sensor on. Turns on and off when the film end sensor gear turns around. Vx: Vox signal: Detection signal for the tone on the line. Turns on when there is a tone signal on the line.

Note:

The numbers in the boxes (XXX) indicate the keys to be input for the various test modes.

2.5.1. DTMF SIGNAL TONE TRANSMIT SELECTION

When set to ON (=1), the 12 keys and transmission frequencies are shown as follows.

key	High Frequency (Hz)	Key	Low Frequency (Hz)
"1"	697	"5"	1209
"2"	770	"6"	1336
"3"	852	"7"	1477
"4"	941	"8"	1633

When set to OFF (=2), the 12 keys and transmission frequencies are shown as follows.

High (Hz) / Low (Hz)	1209	1336	1477
697	"1"	"2"	"3"
770	"4"	"5"	"6"
852	"7"	"8"	"9"
941	*	"0"	"#"

Note: After performing this check, do not forget to turn the setting off. Otherwise, dialing in DTMF signal will not work.

2.5.2. BUTTON CODE TABLE

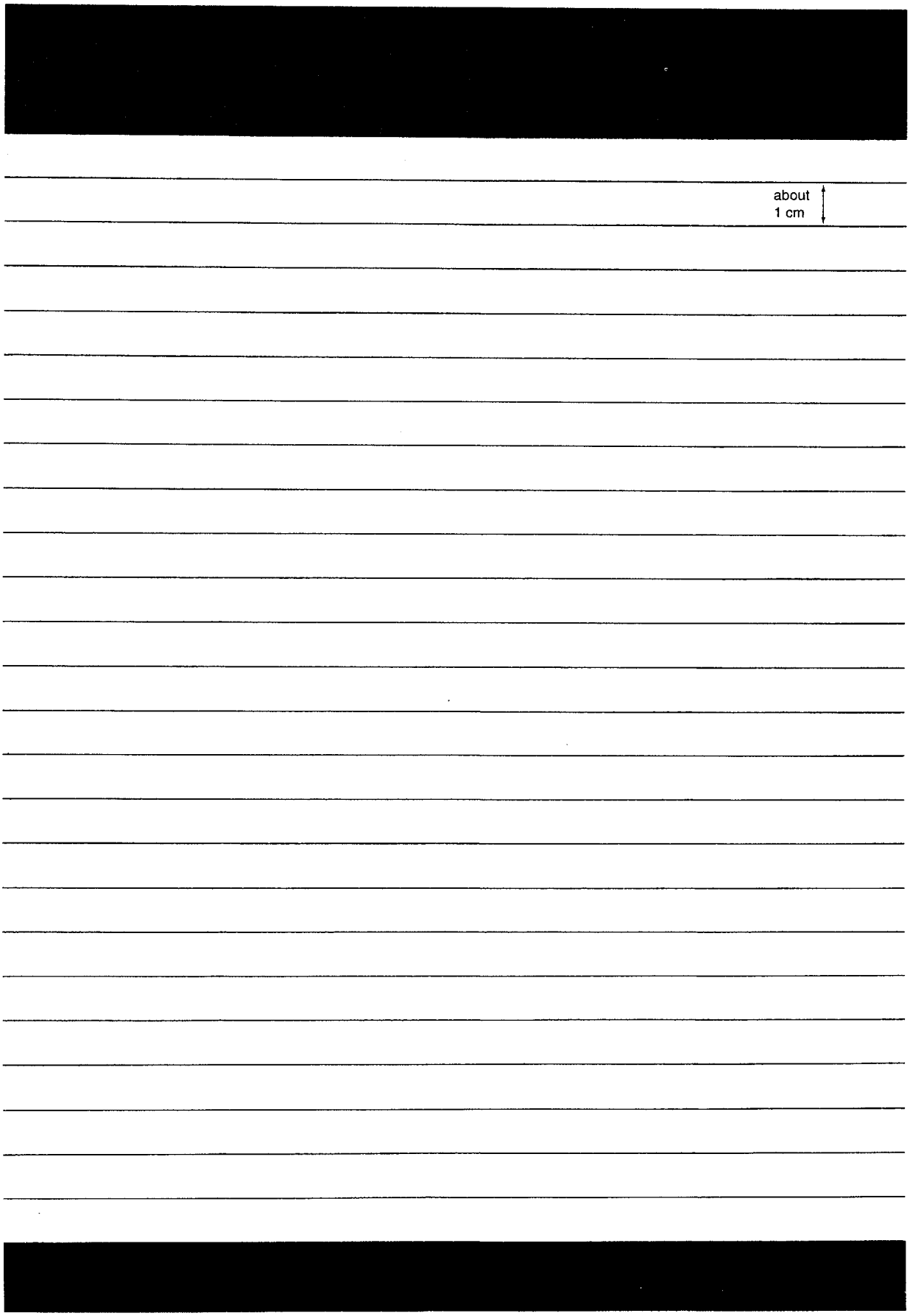
Code	Button Name	Code	Button Name	Code	Button Name
02	RESOLUTION	26	▼ VOLUME	3D	REDIAL/PAUSE
04	START/COPY/SET	31	1	47	CALLER ID
05	LOWER	32	2	48	IQ-FAX
08	SP-PHONE	33	3	49	QUICK SCAN
0A	MUTE	34	4	64	STATION 1
0C	RECEIVE MODE	35	5	65	STATION 2
14	RECORD	36	6	66	STATION 3
16	ERASE	37	7	1E	JOG (RIGHT)
18	PLAY MESSAGES	38	8	1F	JOG (LEFT)
20	MENU	39	9		
22	HELP	3A	0	00	NO INPUT
24	DIRECTORY	3B	*	01	STOP
25	▲ VOLUME	3C	#		

Note:

These codes (00, 01) are only for the data in the History Report.

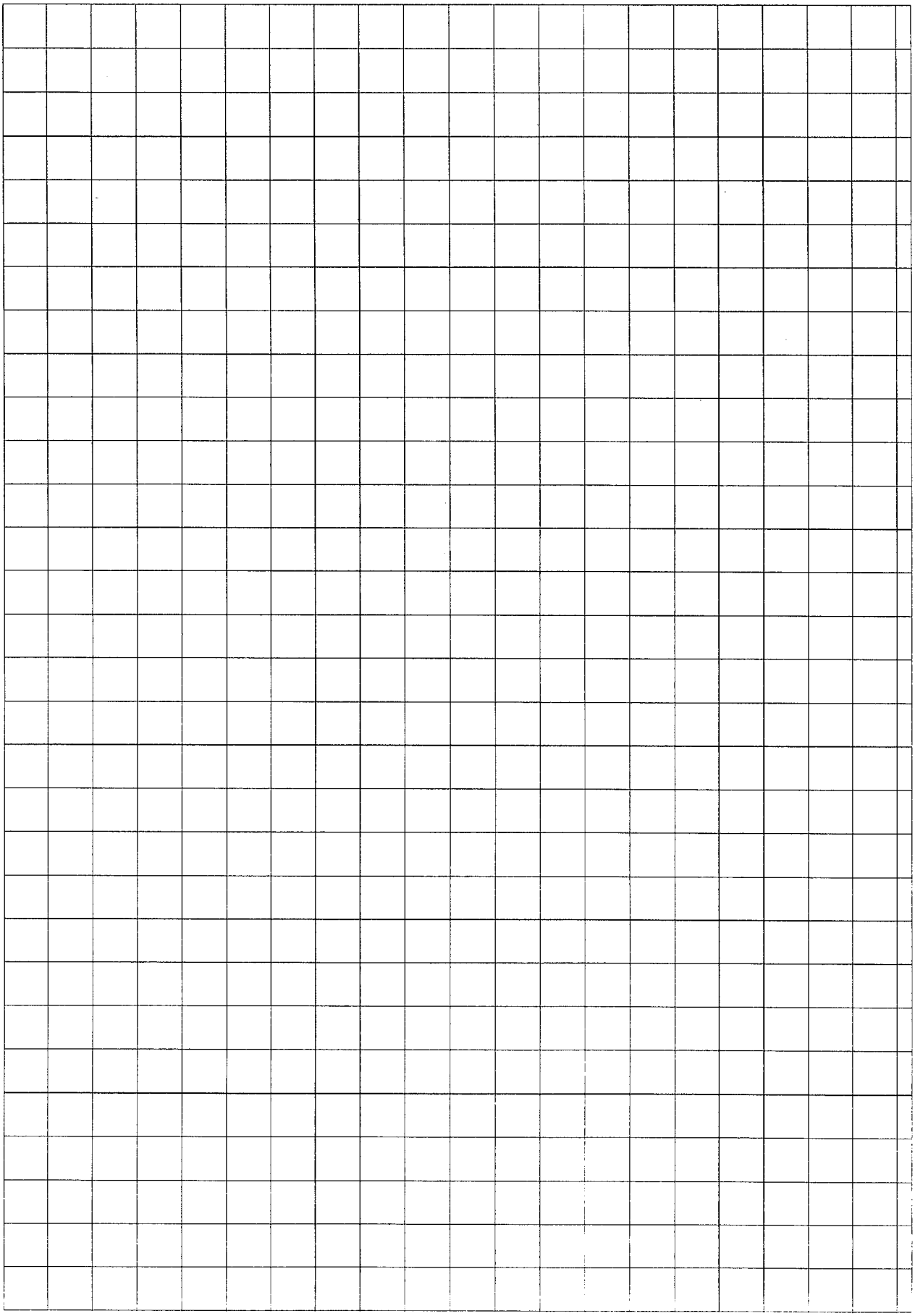
2.5.3. PRINT TEST PATTERN

1. Platen roller



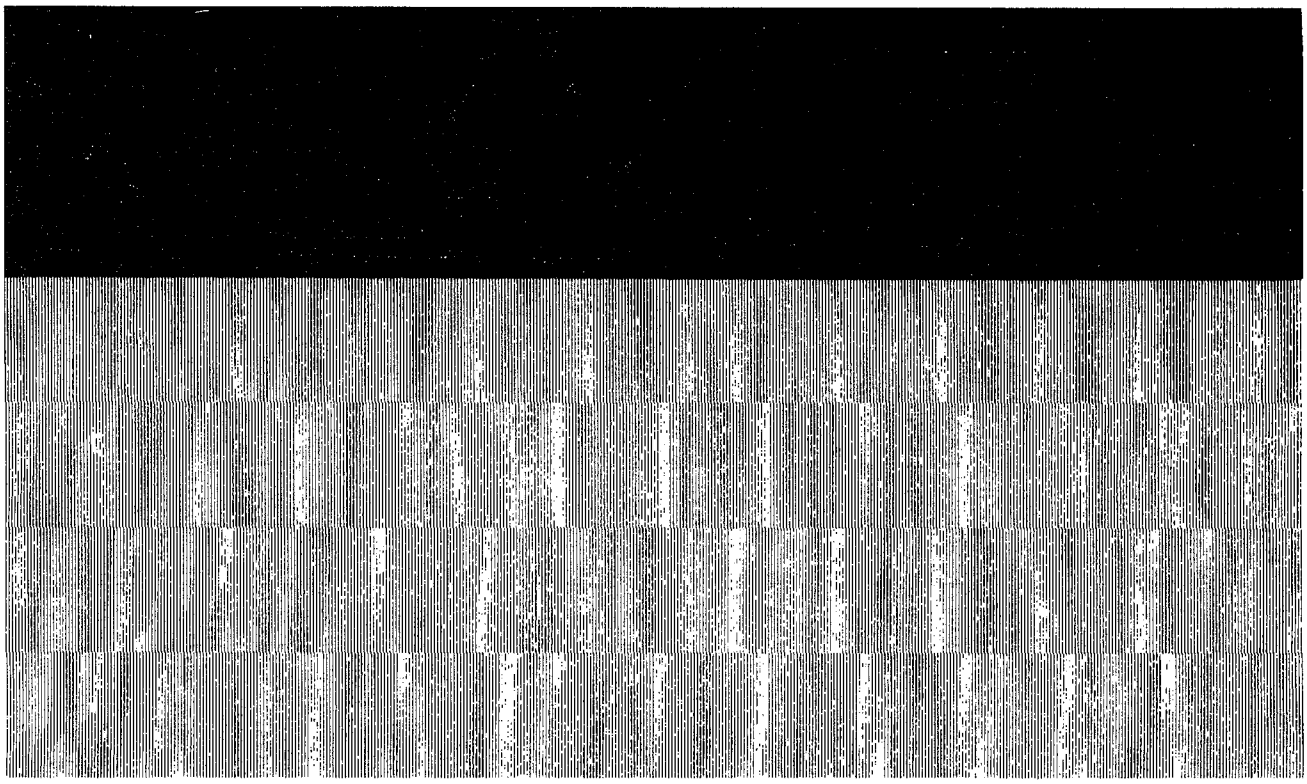
(Reference pattern)

2. Left margin/Top margin



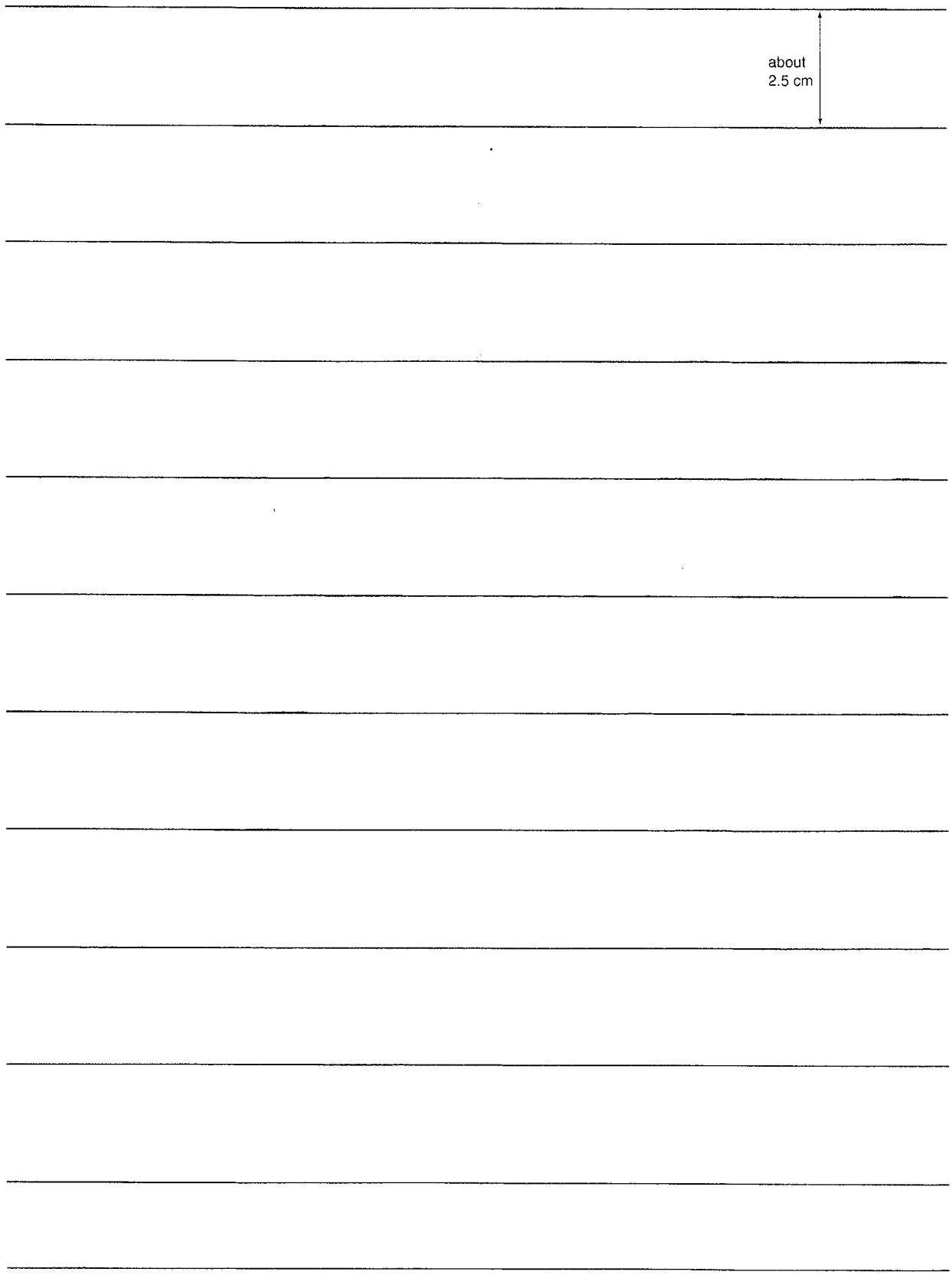
(Reference pattern)

3. Thermal head 1 dot



(Reference pattern)

4. **Use this test pattern to confirm the torque limiter for Ink film and platen roller timing.**



(Reference pattern)

3 ADJUSTMENTS

3.1. TABLE OF TEST EQUIPMENT AND TOOLS

No.	Test Equipment and Jig Name	Jig No.
1	Oscilloscope	--------
2	Extension Cord	PQZZ2K12Z, PQZZ8K18Z

3.2. ADJUSTING THE FEEDER PRESSURE

If misfeeding of a document such as multiple feeding or no feeding occurs frequently, try to adjust the feeder pressure by following the steps below.

1. Slide the cover open lever forwards to open the front cover.
2. Shift the position of the lever by using an instrument with a pointed end like a clip or a ball-point pen.
   Position A: Select this position when documents are not fed.
   Position B: Standard position (pre-selected)
   Position C: Select this position when documents are multiple-fed.
3. Close the front cover securely by pushing down on both ends.

3.3. CONFIRMING THE SEPARATION SPRING

Note:

Be careful not to bend the separation spring.

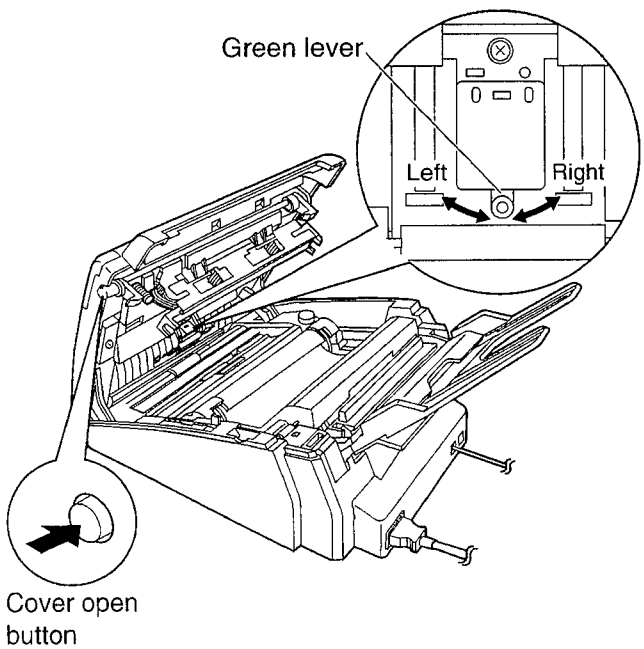
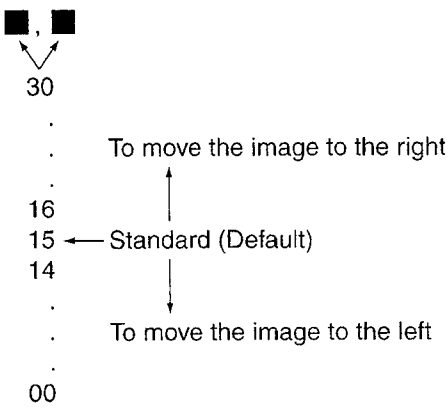


Fig. 1

3.4. DOCUMENT READ START POSITION ADJUSTMENT

1. Connect the AC cord.
2. Copy the document and confirm the read start position of the document. Compare the printout (copy) with the original document.
3. If out of position, adjust the read position.
4. Press the MENU button.
5. Press the #, 9, 0, 0, 0, and 5, 6, 3 buttons.
6. Press the ■,■, SET and MENU buttons.



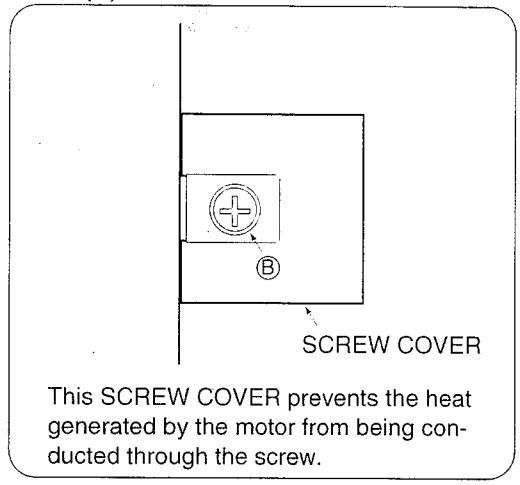
The read start position moves 1 mm in an increment.

4 DISASSEMBLY INSTRUCTIONS

Ref. No. 1	HOW TO REMOVE THE BOTTOM FRAME
Procedure 1	

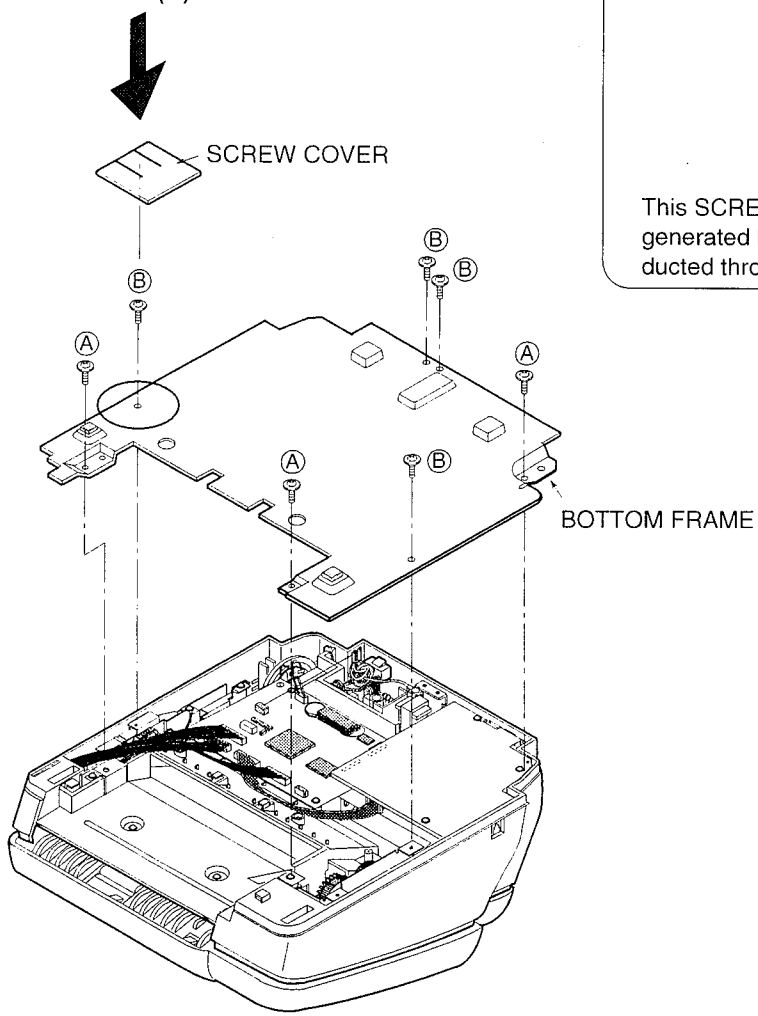
1) Remove the 3 screws Ⓐ.
2) Remove the 4 screws Ⓑ.
3) Remove the BOTTOM FRAME.

View (A)



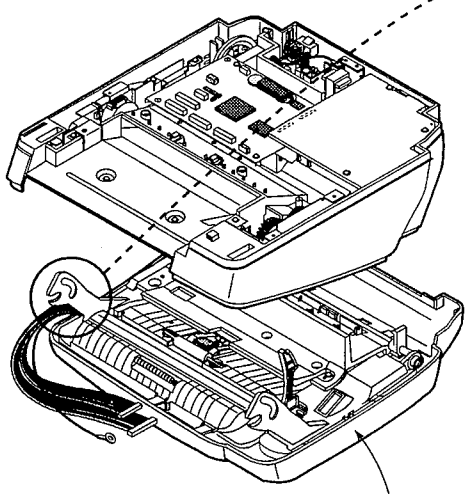
This SCREW COVER prevents the heat generated by the motor from being conducted through the screw.

View (A)

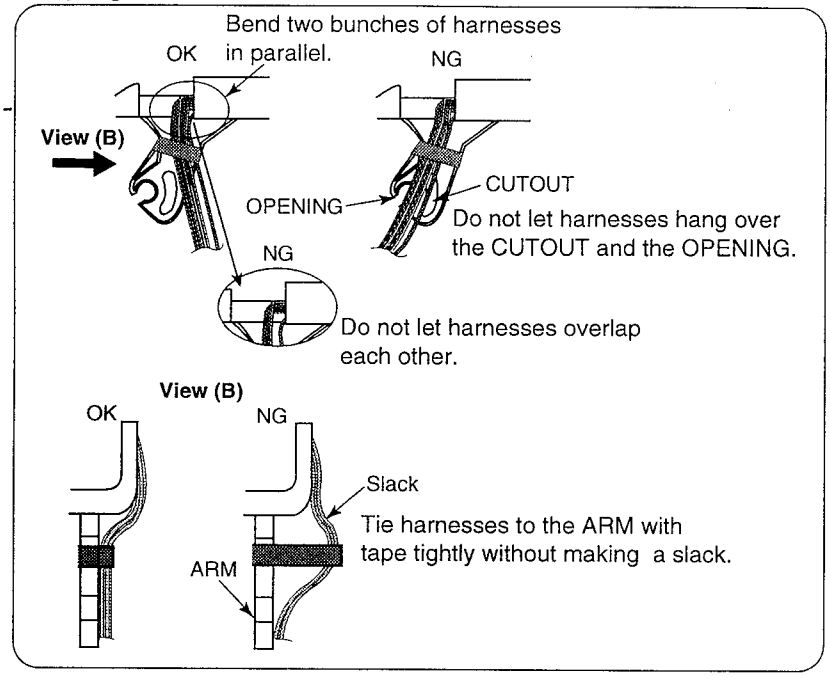


Ref. No. 2	HOW TO REMOVE THE OPERATION PANEL BLOCK
Procedure 1→2	

1) Unhook all the connectors connecting the main cabinet with the OPERATION PANEL BLOCK.



Taping Position



2) Push the COVER OPEN BUTTON to open the OPERATION PANEL BLOCK.
3) Tilt the unit vertically so that its left side faces on a flat surface like a table. While holding down the grey-shaded ARM as illustrated in Fig. A ①, insert a screwdriver and unlatch the ARM as illustrated in Fig. A ②.
4) Pull out both sides of the arms (in the direction of the arrow shown in Fig. B).
5) Remove the OPERATION PANEL BLOCK.

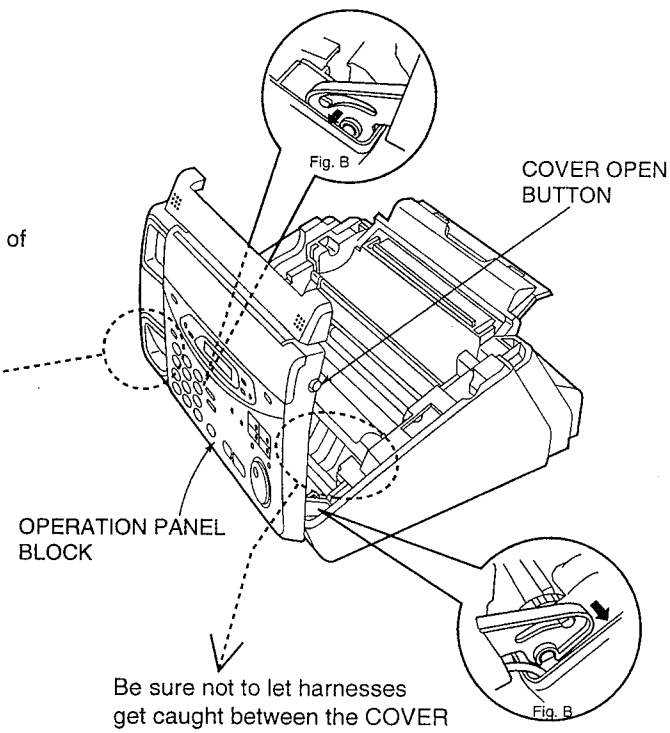


Fig. B
COVER OPEN BUTTON
OPERATION PANEL BLOCK
Be sure not to let harnesses get caught between the COVER and the cabinet during the installation.
Fig. B

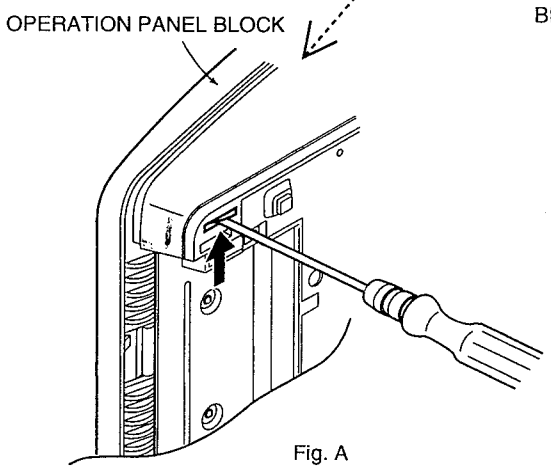
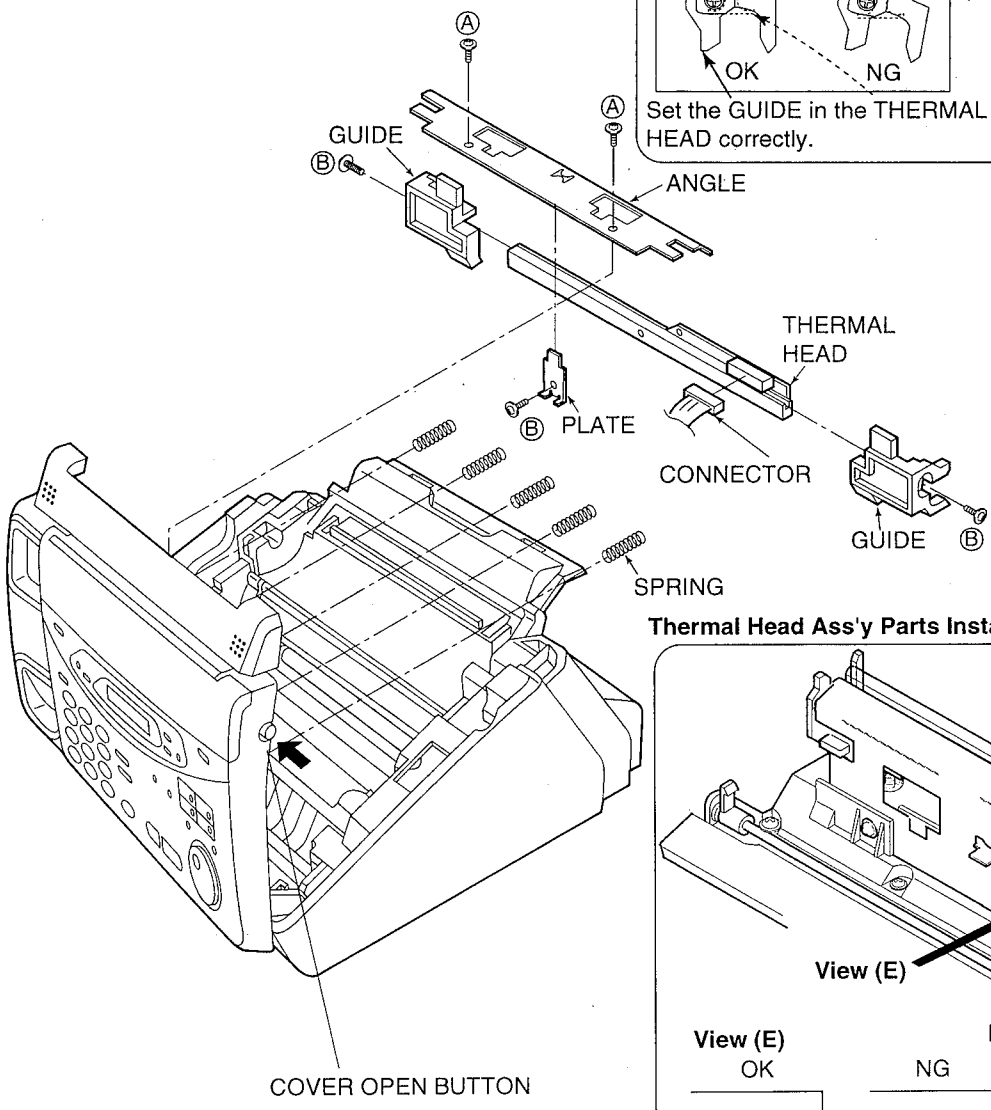


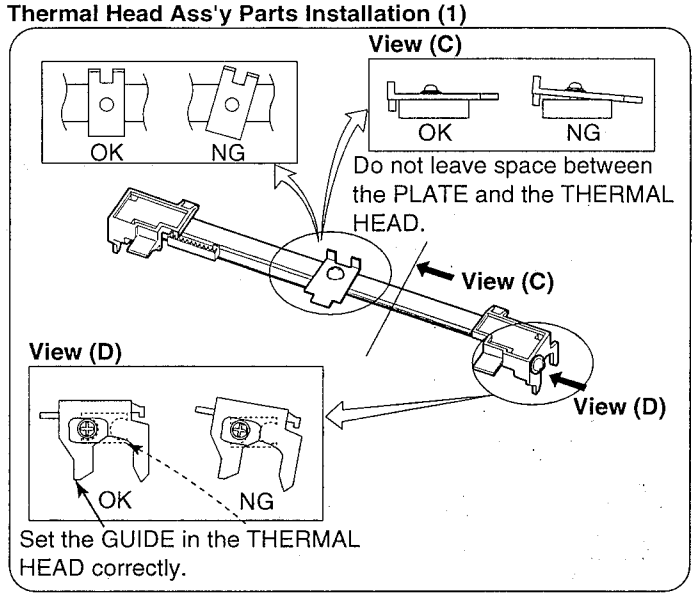
Fig. A

Ref. No. 3	HOW TO REMOVE THE THERMAL HEAD
Procedure 3	

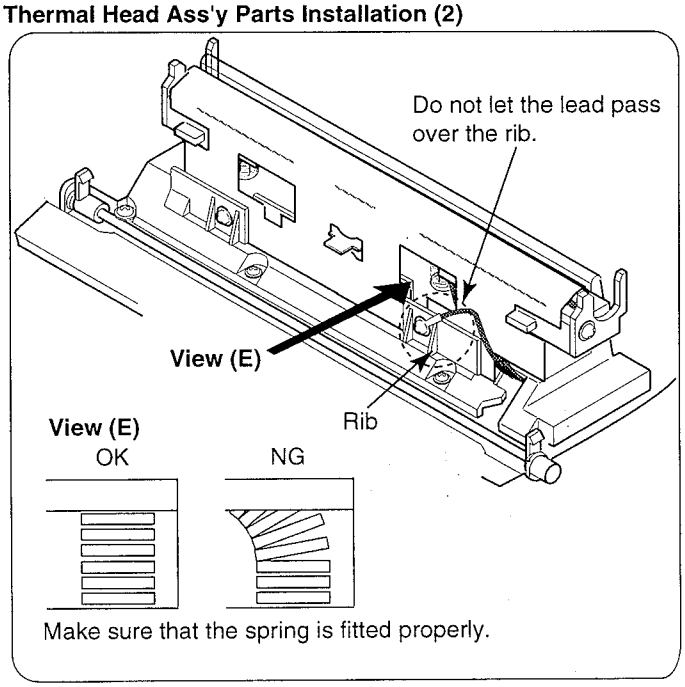
1) Push the COVER OPEN BUTTON to open the operation panel.
2) Remove the 2 screws Ⓐ.
3) Remove the ANGLE.
4) Disconnect the CONNECTOR.
5) Remove the thermal head ass'y.
6) Remove the 3 screws Ⓑ.
7) Remove the 2 GUIDEs and the PLATE.
8) Remove the 3 SPRINGs.
9) Remove the THERMAL HEAD.



Thermal Head Ass'y Parts Installation (1)

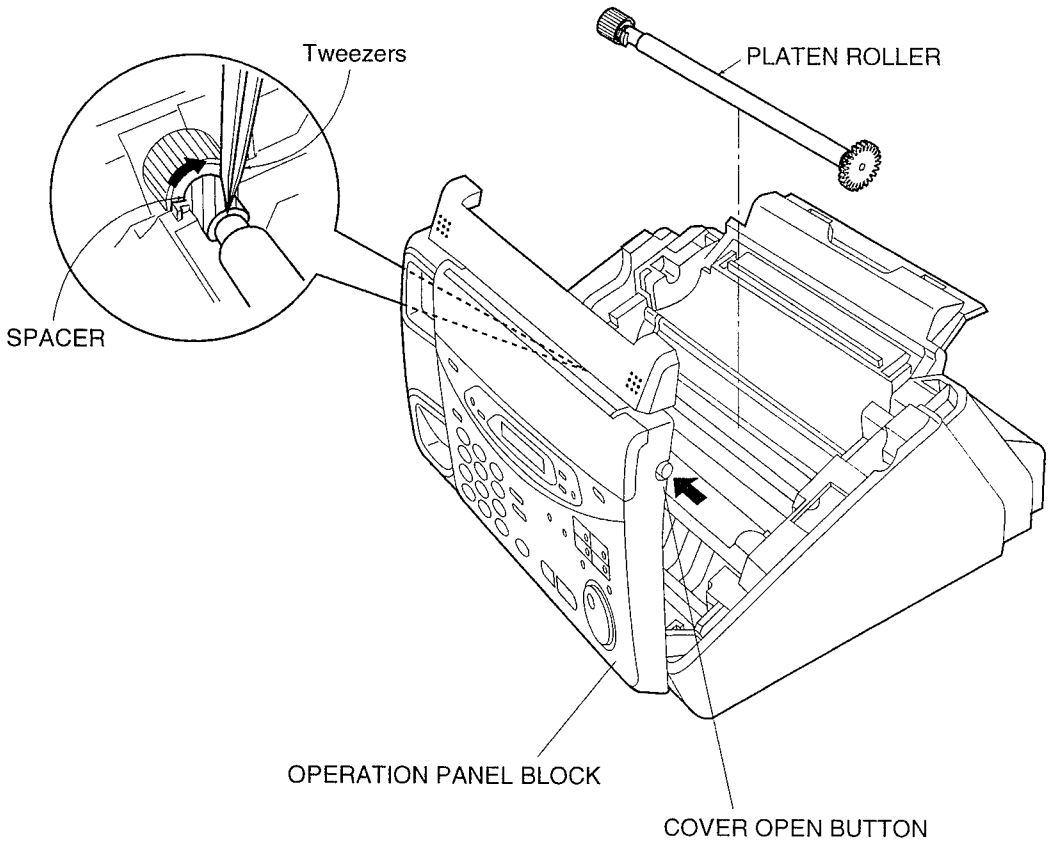


Thermal Head Ass'y Parts Installation (2)



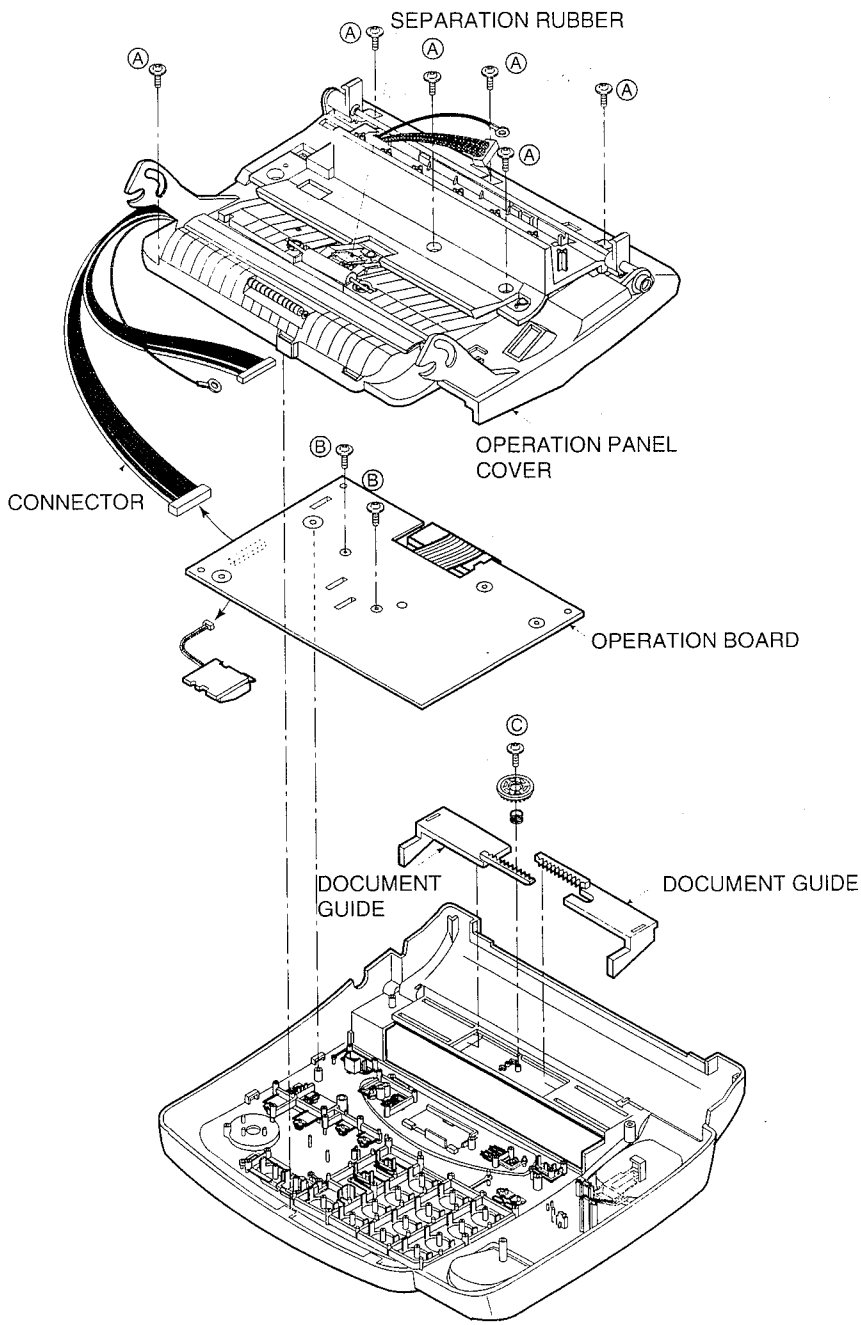
Ref. No. 4	HOW TO REMOVE THE PLATEN ROLLER
Procedure 4	

1) Remove the film cartridge.
2) Push the COVER OPEN BUTTON to open the OPERATION PANEL BLOCK.
3) Detach the SPACERs from the ribs as illustrated below.
4) Remove the PLATEN ROLLER.



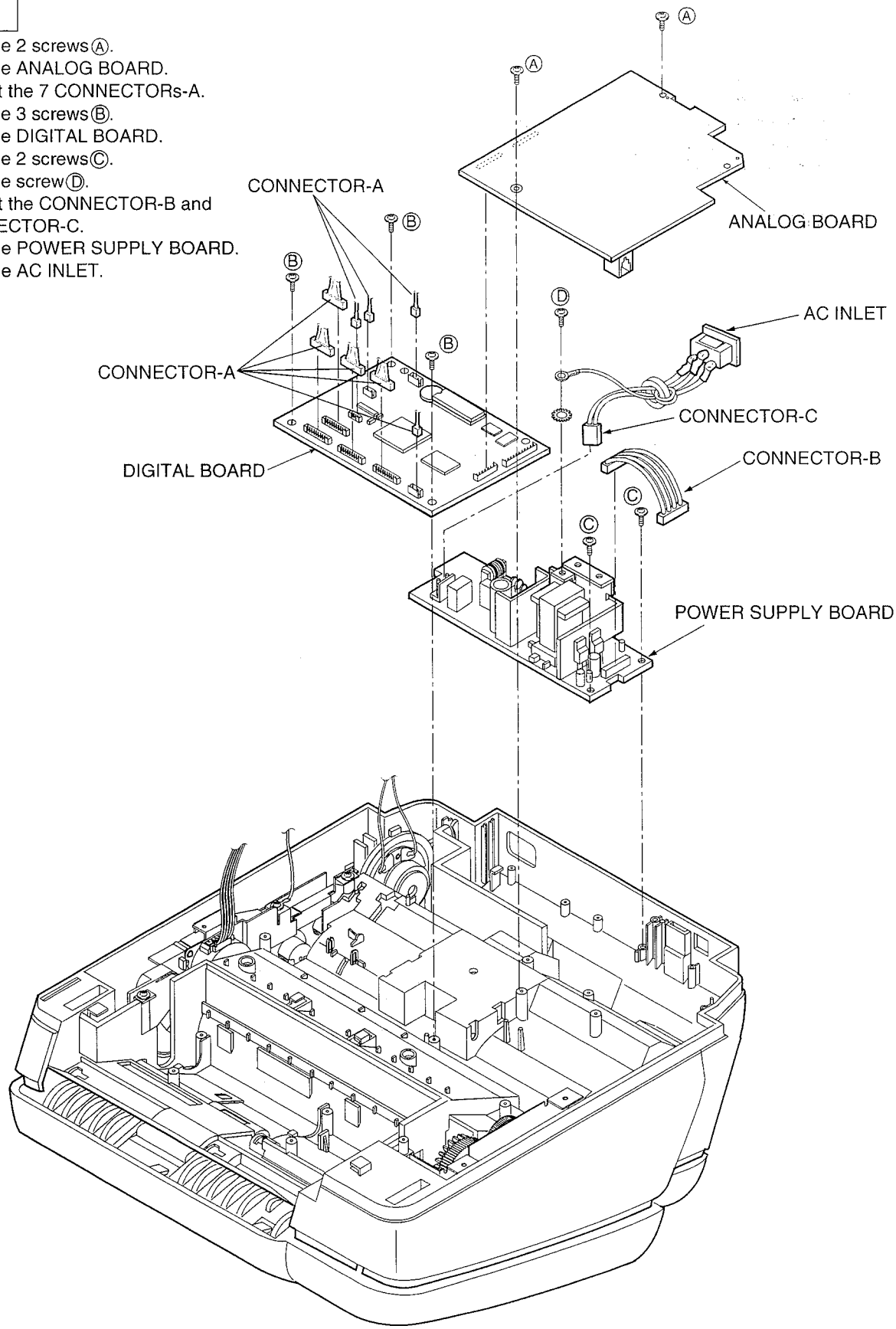
Ref. No. 5	HOW TO REMOVE THE OPERATION BOARD, LCD AND DOCUMENT GUIDE
Procedure 2→5	

1) Remove the 6 screws Ⓐ.
2) Remove the OPERATION PANEL COVER.
3) Remove the 2 screws Ⓑ.
4) Disconnect the CONNECTOR.
5) Remove the OPERATION BOARD.
6) Remove the screw Ⓒ.
7) Remove the DOCUMENT GUIDEs.



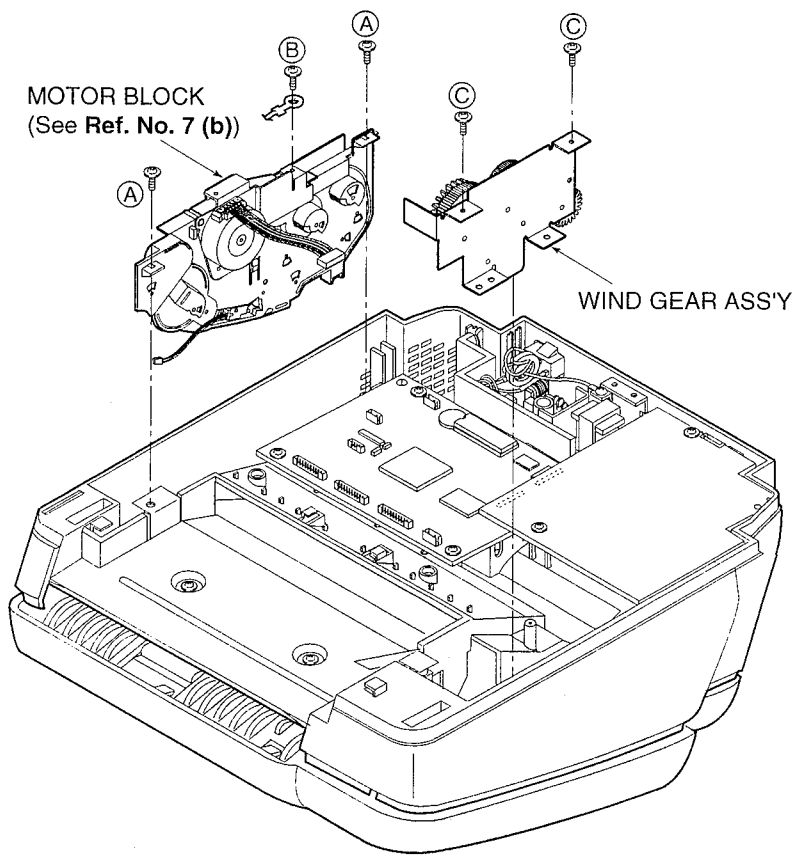
Ref. No. 6	HOW TO REMOVE THE ANALOG, DIGITAL AND POWER SUPPLY BOARDS AND AC INLET
Procedure 1→6	

1) Remove the 2 screws Ⓐ.
2) Remove the ANALOG BOARD.
3) Disconnect the 7 CONNECTORs-A.
4) Remove the 3 screws Ⓑ.
5) Remove the DIGITAL BOARD.
6) Remove the 2 screws Ⓒ.
7) Remove the screw Ⓓ.
8) Disconnect the CONNECTOR-B and the CONNECTOR-C.
9) Remove the POWER SUPPLY BOARD.
10) Remove the AC INLET.



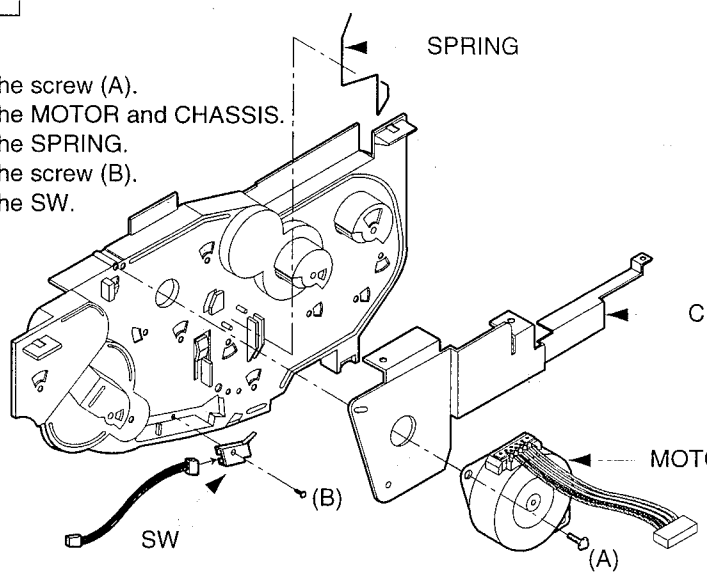
Ref. No. 7 (a)	**HOW TO REMOVE THE MOTOR BLOCK AND THE WIND GEAR ASS'Y**
Procedure 1–7 (a)	

1) Remove the 2 screws Ⓐ.
2) Remove the screw Ⓑ.
3) Remove the MOTOR BLOCK (See **Ref. No. 7 (b)**).
4) Remove the 2 screws Ⓒ.
5) Remove the WIND GEAR ASS'Y.

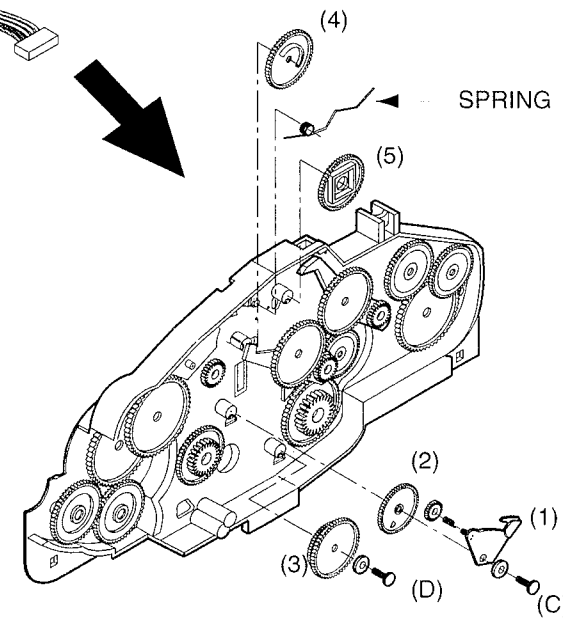


Ref. No. 7 (b)	**HOW TO REMOVE THE MOTOR BLOCK**
Procedure 7 (b)	

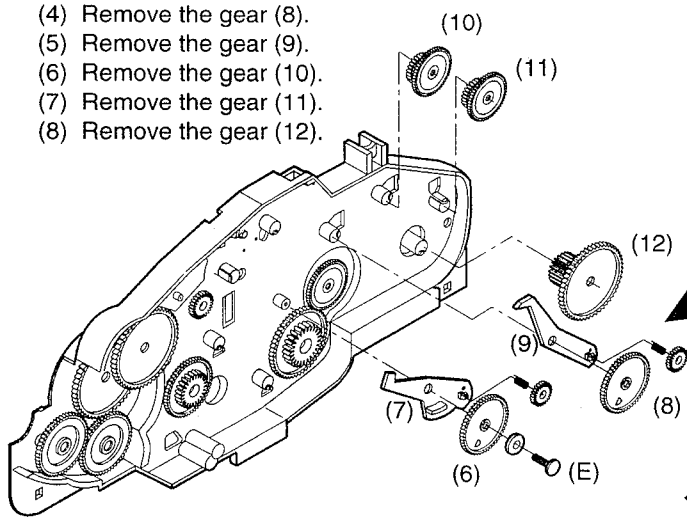
(1) Remove the screw (A).
(2) Remove the MOTOR and CHASSIS.
(3) Remove the SPRING.
(4) Remove the screw (B).
(5) Remove the SW.



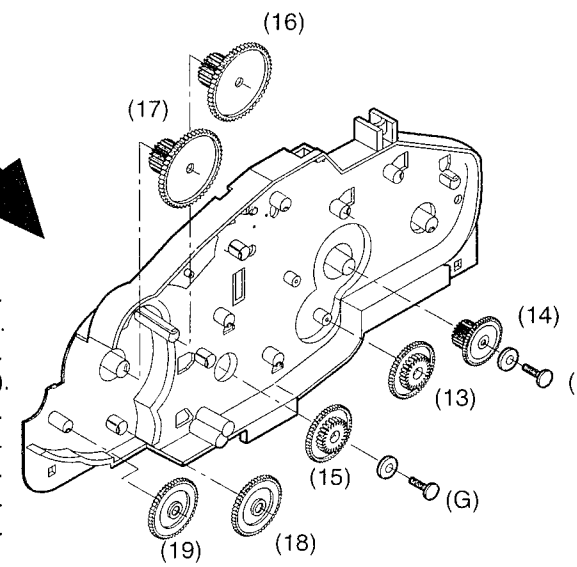
(1) Remove the screw (C).
(2) Remove the gear (1).
(3) Remove the gear (2).
(4) Remove the screw (D).
(5) Remove the gear (3).
(6) Remove the gear (4).
(7) Remove the SPRING.
(8) Remove the gear (5).



(1) Remove the screw (E).
(2) Remove the gear (6).
(3) Remove the gear (7).
(4) Remove the gear (8).
(5) Remove the gear (9).
(6) Remove the gear (10).
(7) Remove the gear (11).
(8) Remove the gear (12).



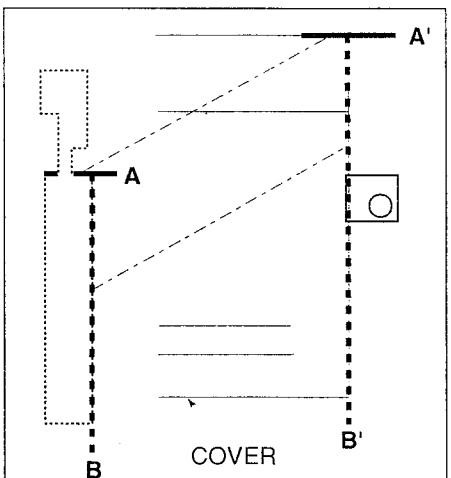
(1) Remove the gear (13).
(2) Remove the screw (F).
(3) Remove the gear (14).
(4) Remove the screw (G).
(5) Remove the gear (15).
(6) Remove the gear (16).
(7) Remove the gear (17).
(8) Remove the gear (18).
(9) Remove the gear (19).



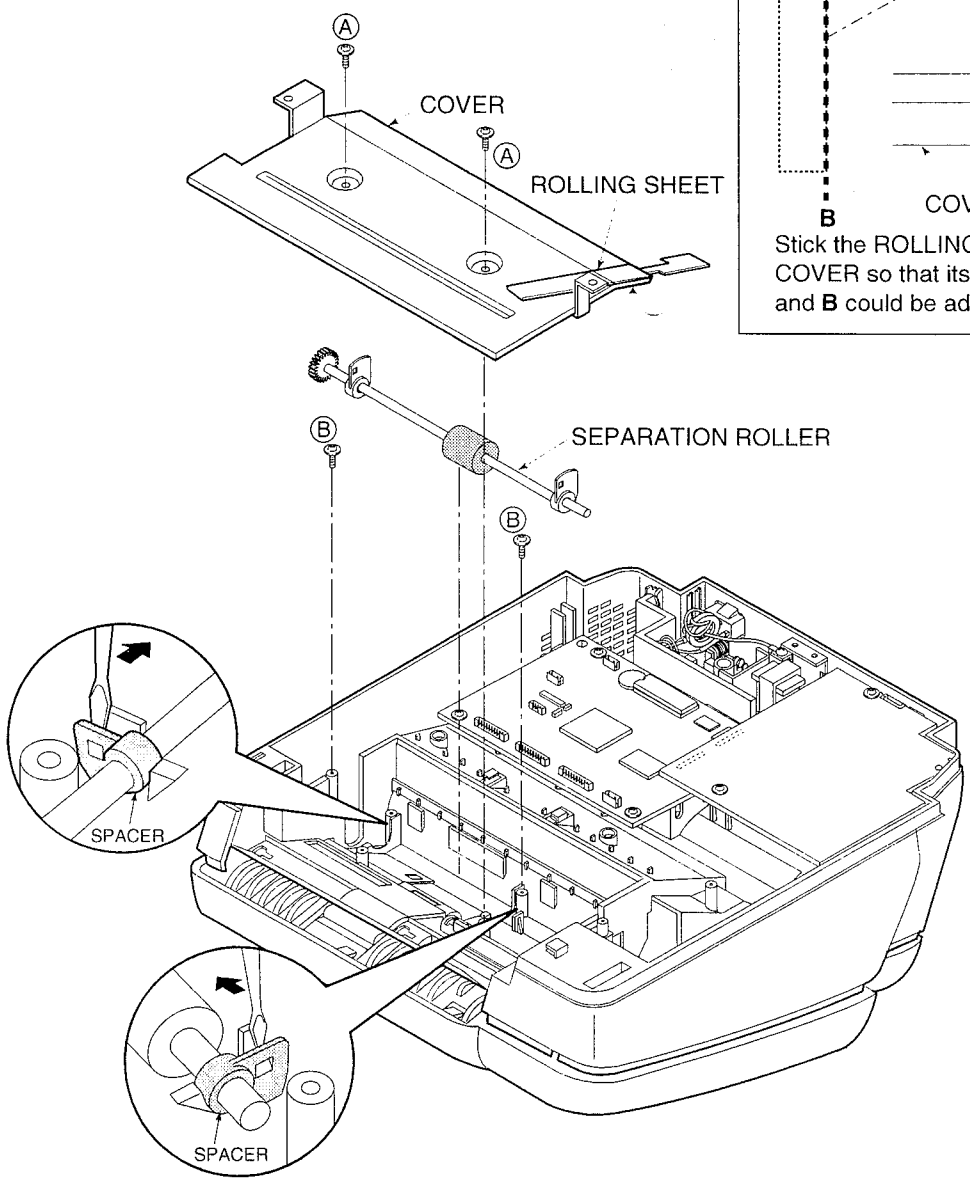
Ref. No. 8	HOW TO REMOVE THE SEPARATION ROLLER
Procedure 1→8	

1) Remove the 2 screws Ⓐ.
2) Remove the COVER.
3) Remove the 2 screws Ⓑ.
4) Detach the SPACERs from the ribs with a screwdriver. (See Fig. C.)
5) Remove the SEPARATION ROLLER.

ROLLING SHEET Position



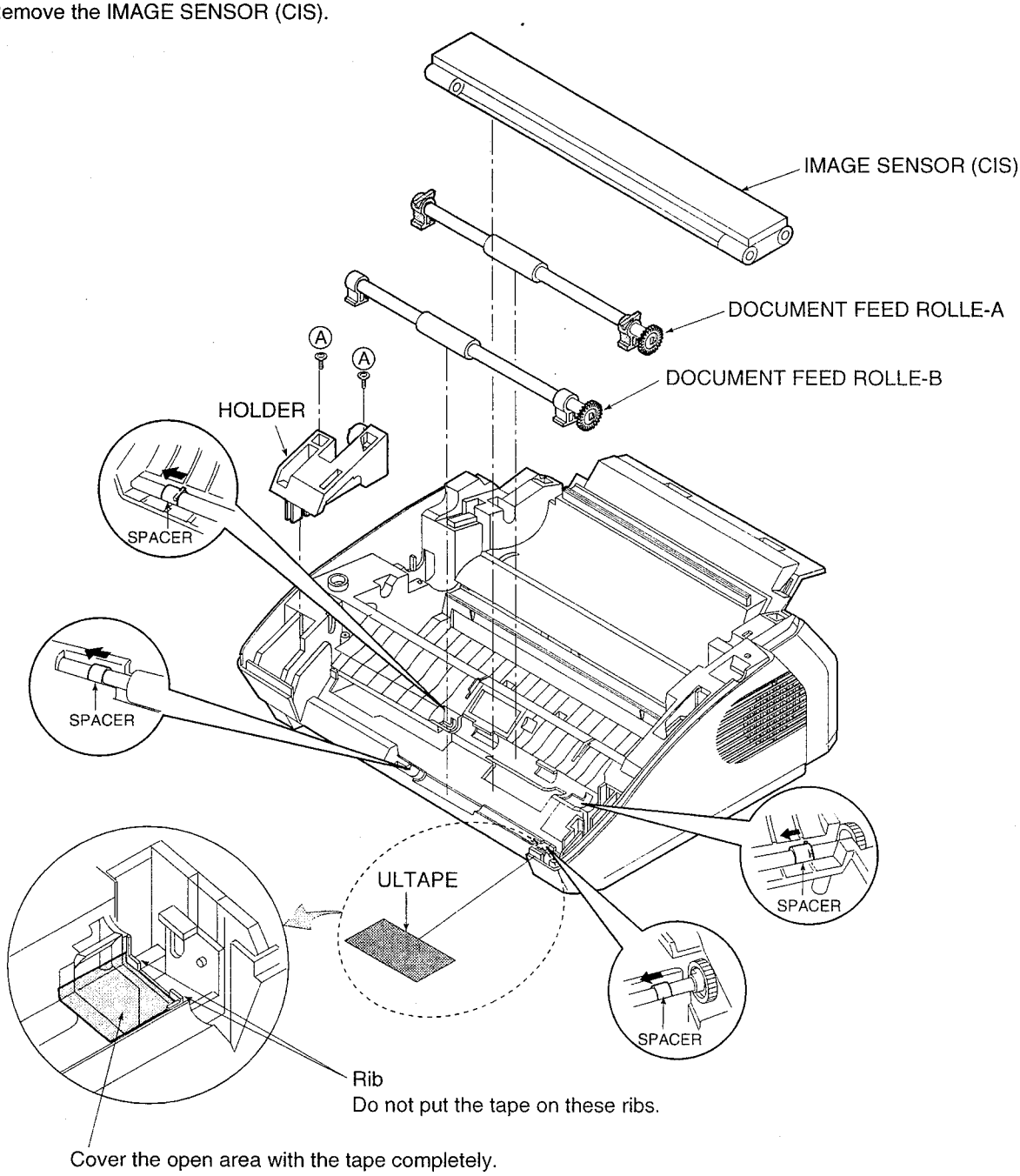
Stick the ROLLING SHEET to the COVER so that its leading edges: **A** and **B** could be adjusted to **A'** and **B'**.



CLEANING:
Clean the SEPARATION ROLLER with a cloth soaked in alcohol.

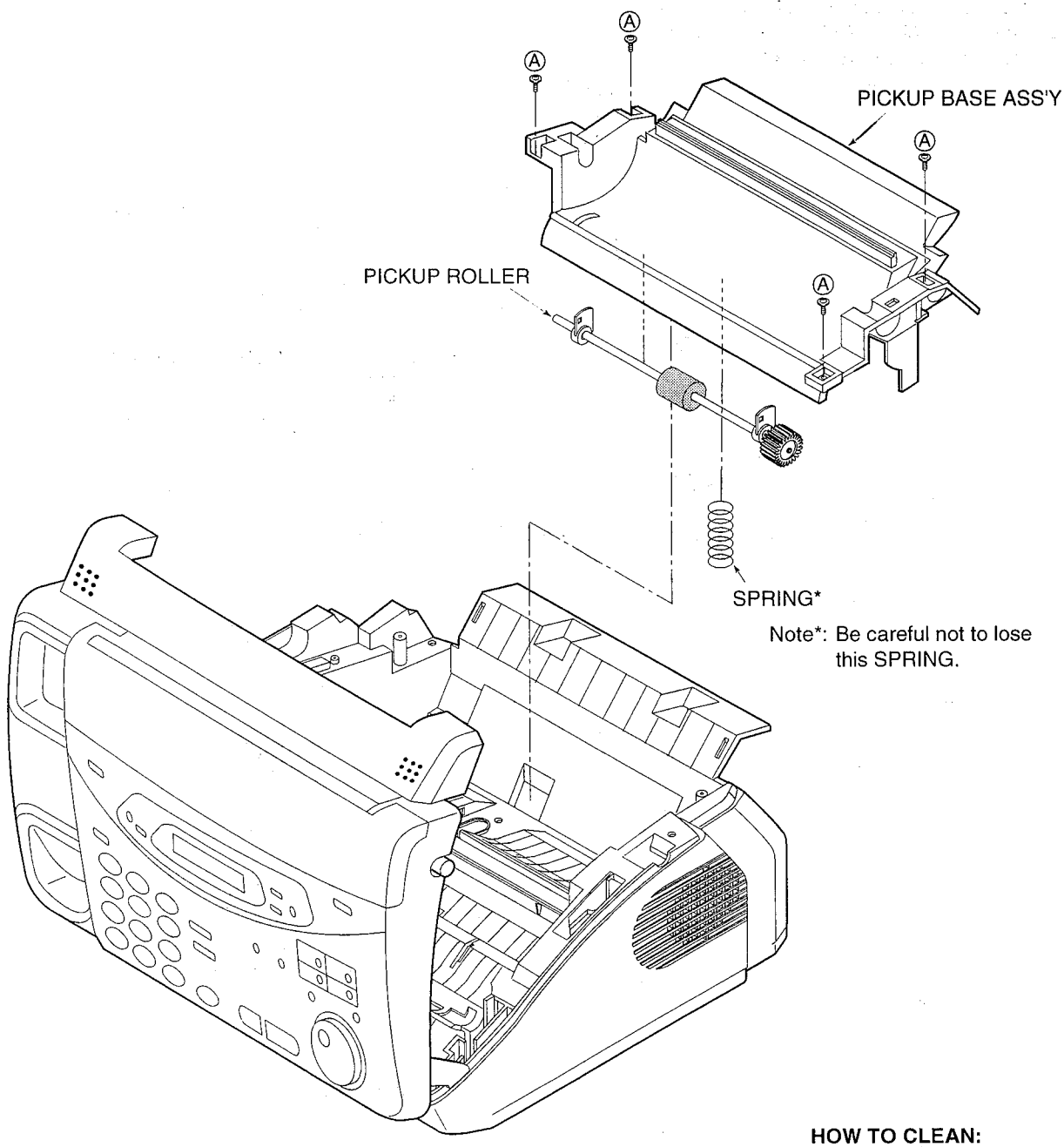
Ref. No. 9	**HOW TO REMOVE THE IMAGE SENSOR (CIS)**
Procedure 2--9	

1) Remove the 2 screws Ⓐ.
2) Remove the HOLDER.
3) Remove the DOCUMENT FEED ROLLER-A and the DOCUMENT FEED ROLLER-B.
4) Remove the IMAGE SENSOR (CIS).



Ref. No. 10	**HOW TO REMOVE THE PICKUP ROLLER**
Procedure 10	

1) Remove the screws Ⓐ.
2) Remove the PICKUP BASE ASS'Y.
3) Remove the PICKUP ROLLER.

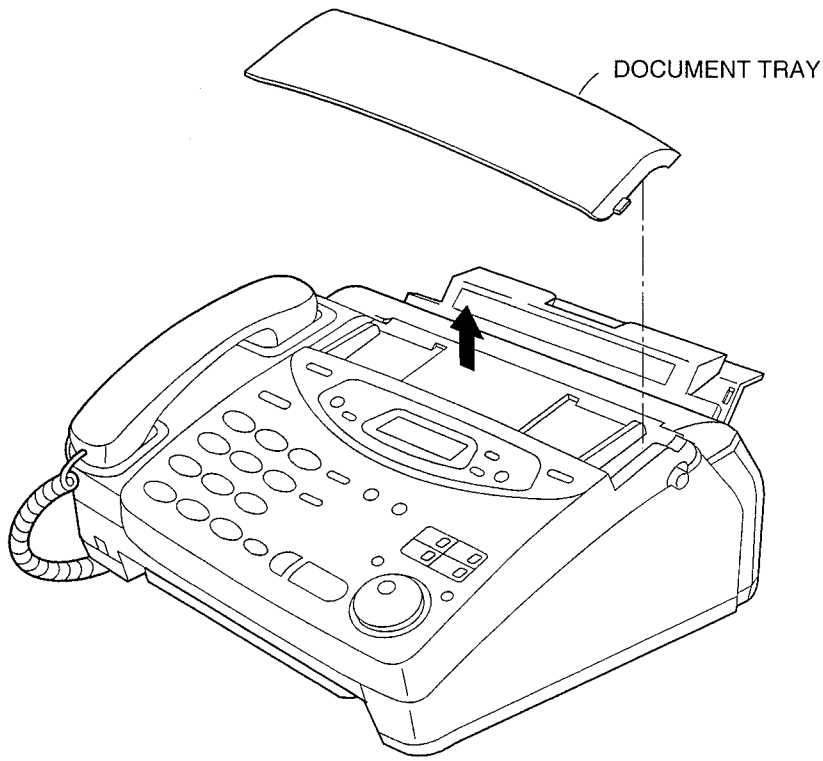


Note*: Be careful not to lose this SPRING.

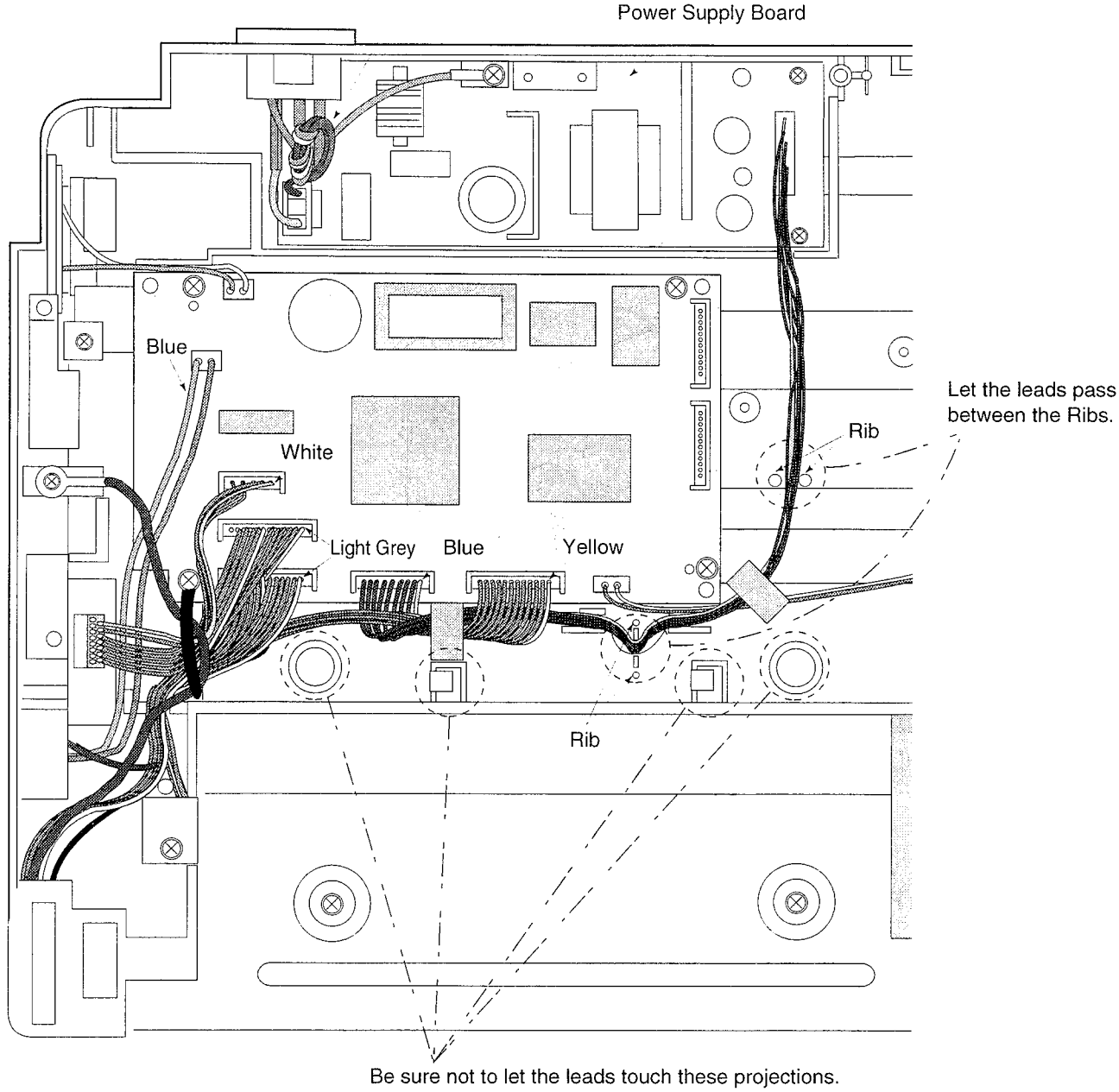
HOW TO CLEAN:
Clean the roller with a cloth soaked in alcohol.

Ref. No. 11	**HOW TO REMOVE THE DOCUMENT TRAY**
Procedure 11	

1) Pull up and remove the DOCUMENT TRAY in the direction of the arrow.



INSTALLATION POSITION OF THE LEAD WIRES



5 HOW TO REPLACE THE FLAT PACKAGE IC

Even if you do not have the special tools (for example, a spot heater) to remove the Flat IC, with some solder (large amount), a soldering iron and a cutter knife, you can easily remove the ICs that have more than 100 pins.

5.1. PREPARATION

- SOLDER

  Sparkle Solder 115A-1, 115B-1 OR Almit Solder KR-19, KR-19RMA

- Soldering iron

  Recommended power consumption is between 30 W to 40 W.
  Temperature of Copper Rod 662 ± 50°F (350 ± 10°C)
  (An expert may handle a 60~80 W iron, but a beginner might damage the foil by overheating.)

- Flux

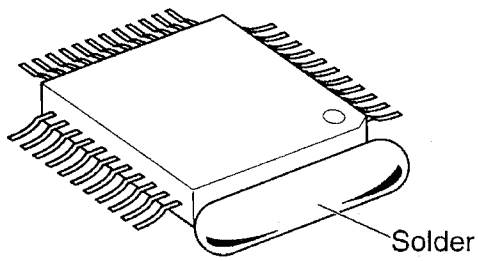
  HI115 Specific gravity 0.863
  (Original flux should be replaced daily.)

5.2. FLAT PACKAGE IC REMOVAL PROCEDURE

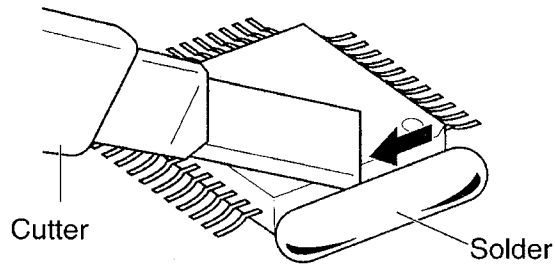
1. Put plenty of solder on the IC pins so that the pins can be completely covered.

   Note:

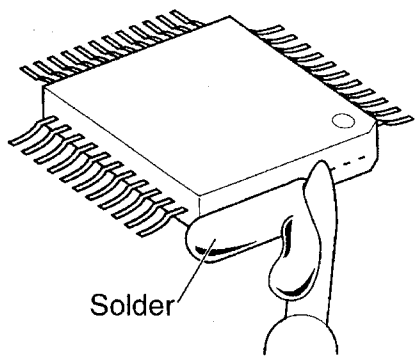
   If the IC pins are not soldered enough, you may give pressure to the P.C. board when cutting the pins with a cutter.



2. Make a few cuts into the joint (between the IC and its pins) first and then cut off the pins thoroughly.



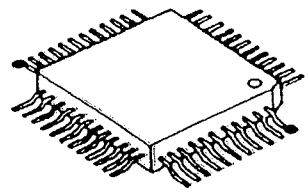
3. While the solder melts, remove it together with the IC pins.



When you attach a new IC to the board, remove all solder left on the land with some tools like a soldering wire. If some solder is left at the joint on the board, the new IC will not be attached properly.

5.3. FLAT PACKAGE IC INSTALLATION PROCEDURE

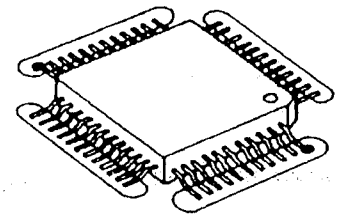
1. Temporarily fix the FLAT PACKAGE IC, soldering the two marked pins.



●- - - - - -Temporary soldering point.

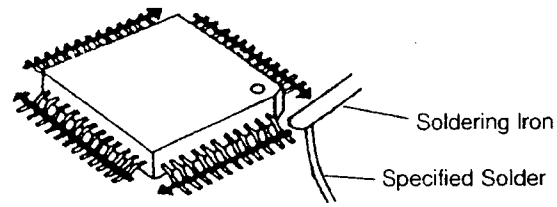
*Check the accuracy of the IC setting with the corresponding soldering foil.

2. Apply flux to all pins of the FLAT PACKAGE IC.



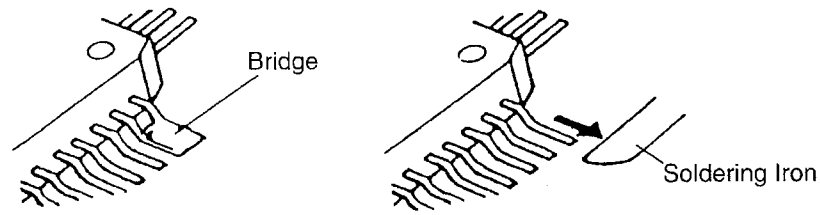
- - - - - -Flux

3. Solder the pins, sliding the soldering iron in the direction of the arrow.



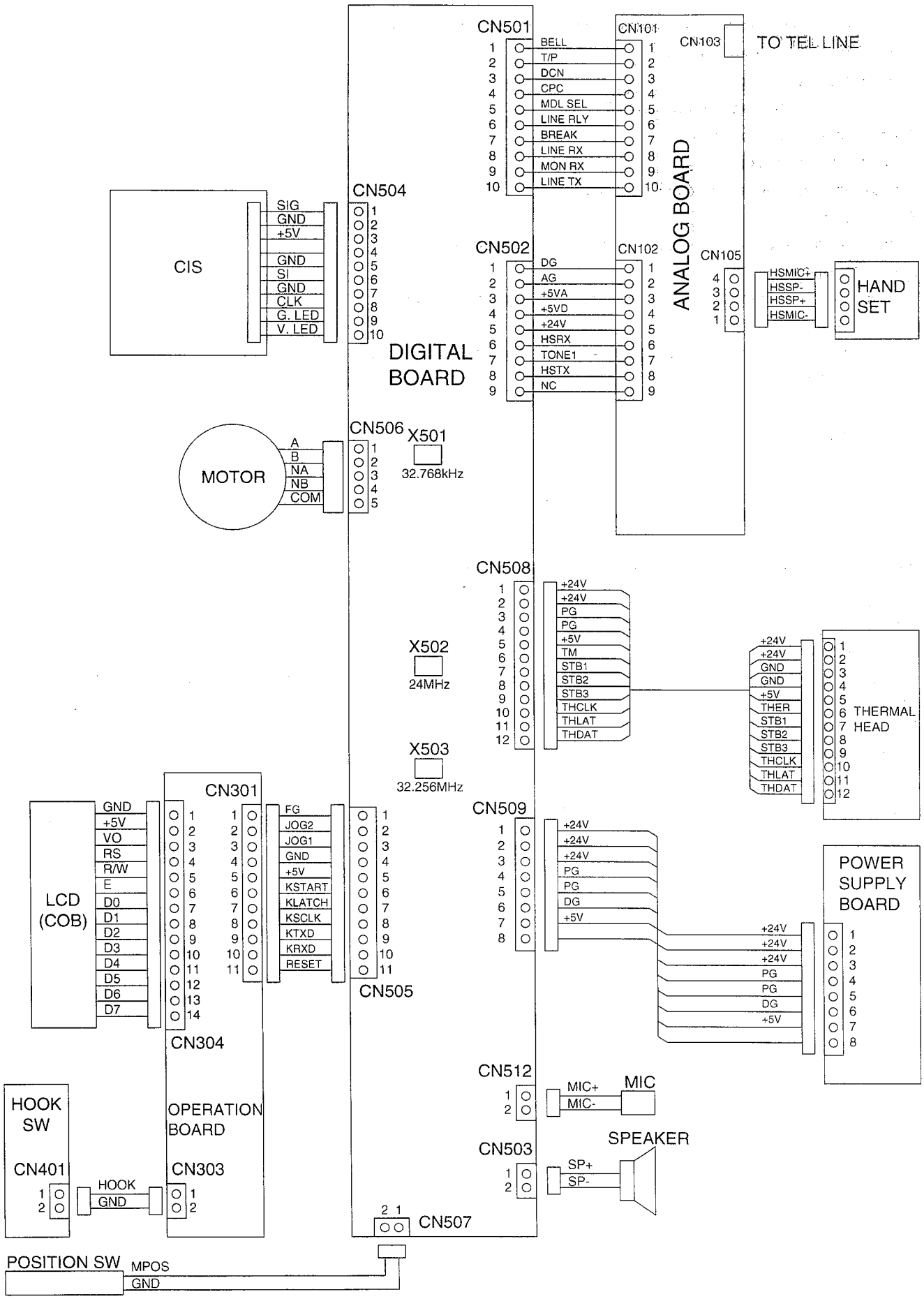
5.4. BRIDGE MODIFICATION PROCEDURE

1. Lightly resolder the bridged portion.
2. Remove the remaining solder along the pins using a soldering iron as shown in the figure below.



6 CIRCUIT OPERATIONS

6.1. CONNECTION DIAGRAM



6.2. GENERAL BLOCK DIAGRAM

The following is an outline of each device IC on the digital board. (Refer to **6.2.1. General Block Diagram**.).

1. ASIC (IC501)

   Composed mainly of an address decoder and a modem control.

   Controls the general FAX operations.

   Controls the operation panel I/F.

   Controls the thermal head I/F and CIS I/F.

   Performs the image processing.

   CPU and Real time clock

   Provides the reset pulse for each of the major ICs.

2. ROM (IC502)

   Contains all of the program instructions on the unit operations.

3. Static RAM (IC504)

   This memory is used mainly for the parameter working in the storage area.

4. Dynamic RAM (IC503)

   This memory is used mainly for the parameter working in the storage area.

5. MODEM (IC505)

   Performs the modulation and the demodulation for FAX communication.

6. Read Section

   CIS to read transmitted documents.

7. Motor Driver (IC506)

   Drives the transmission motor and the reception motor.

8. Thermal Head

   Contains heat-emitting elements for dot matrix image printing.

9. Analog Board

   Composed of ITS circuit and NCU circuit.

10. Sensor Section

    Composed of a cover open sensor, a document sensor, a read position sensor, a set paper switch, a paper full sensor, a paper top sensor and a film end sensor.

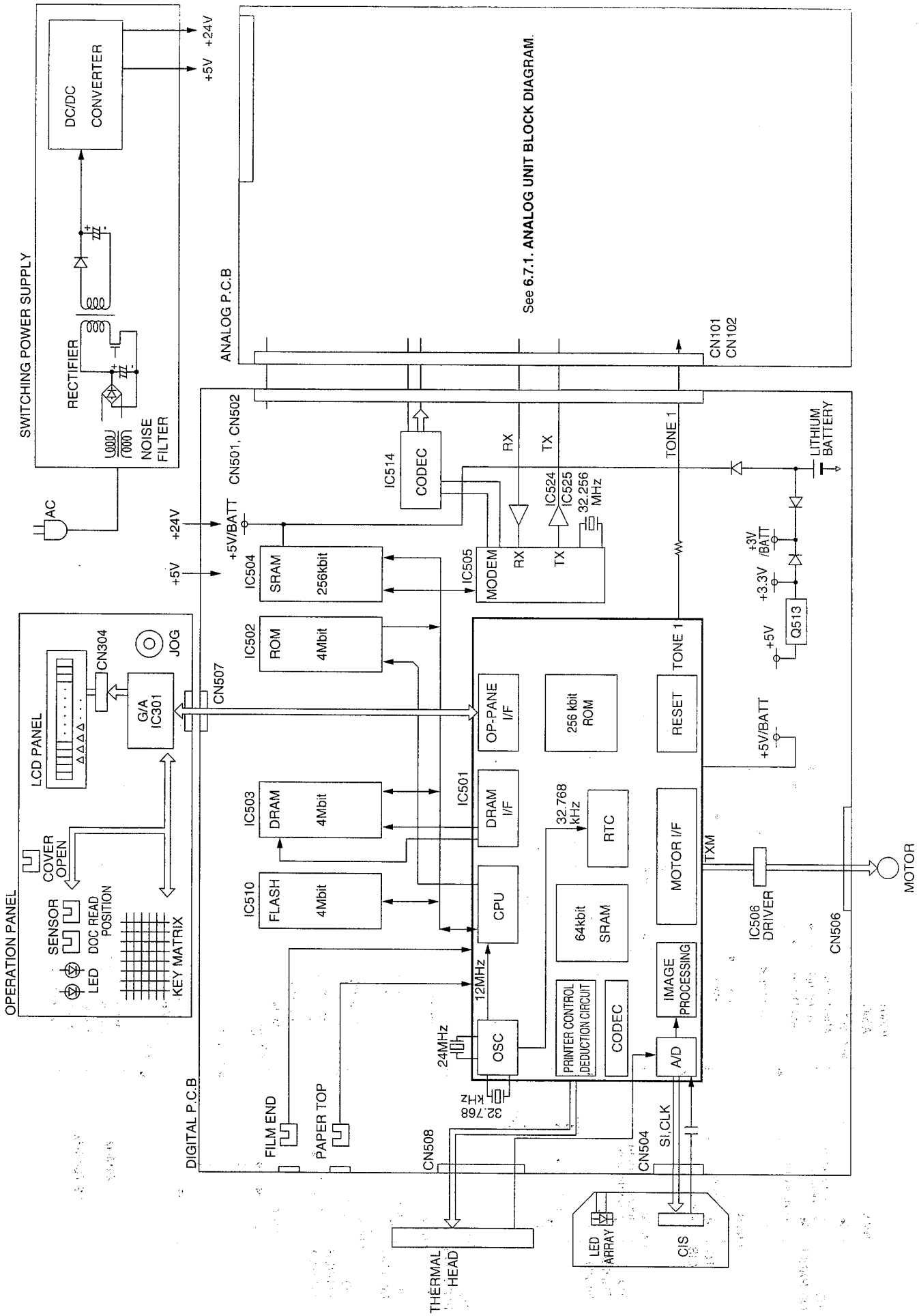
11. Power Supply Board Switching Section

    Supplies +5V and +24V to the unit.

12. Flash Memory (IC510)

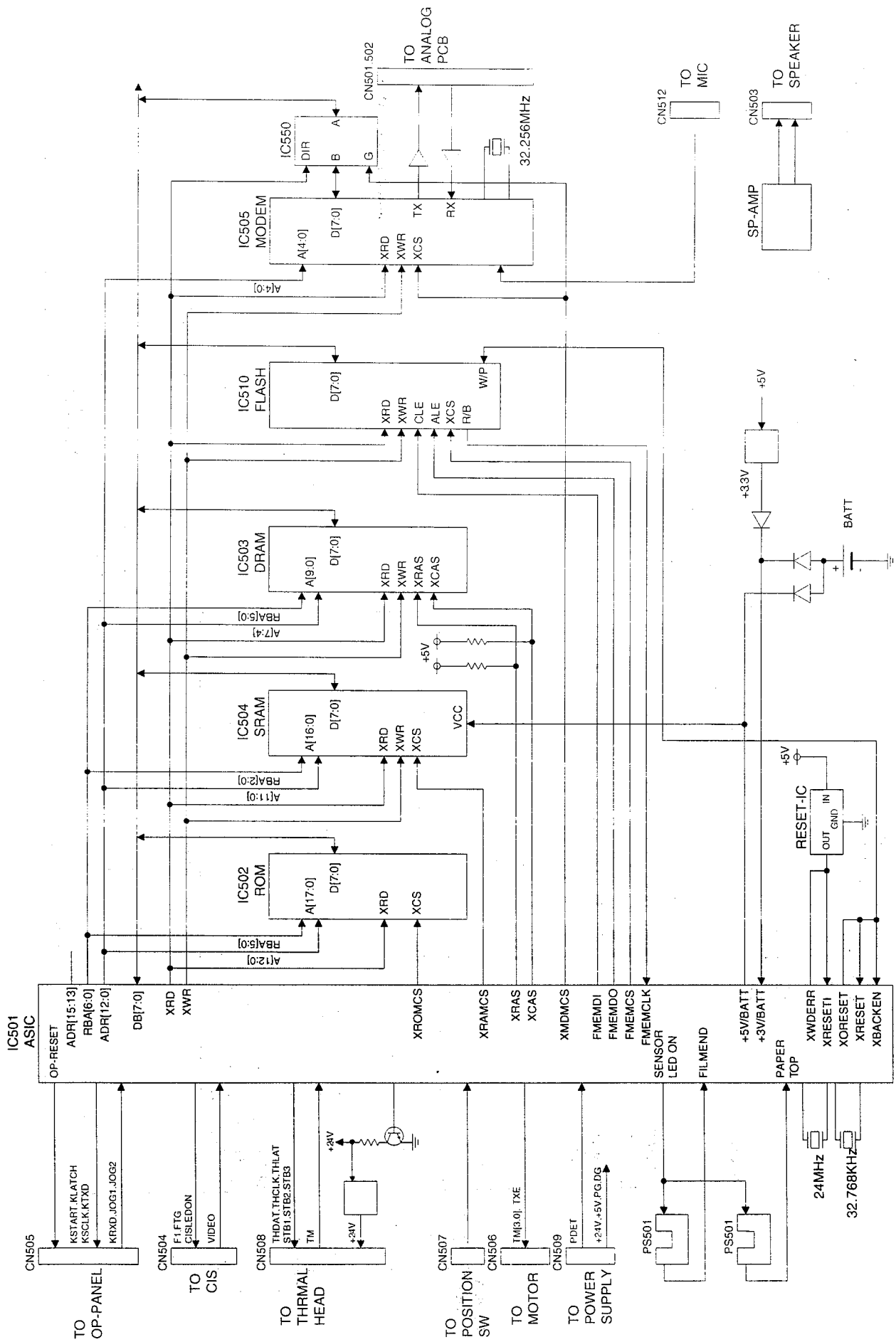
    This memory is used for voice prompt and TAM.

6.2.1. General Block Diagram

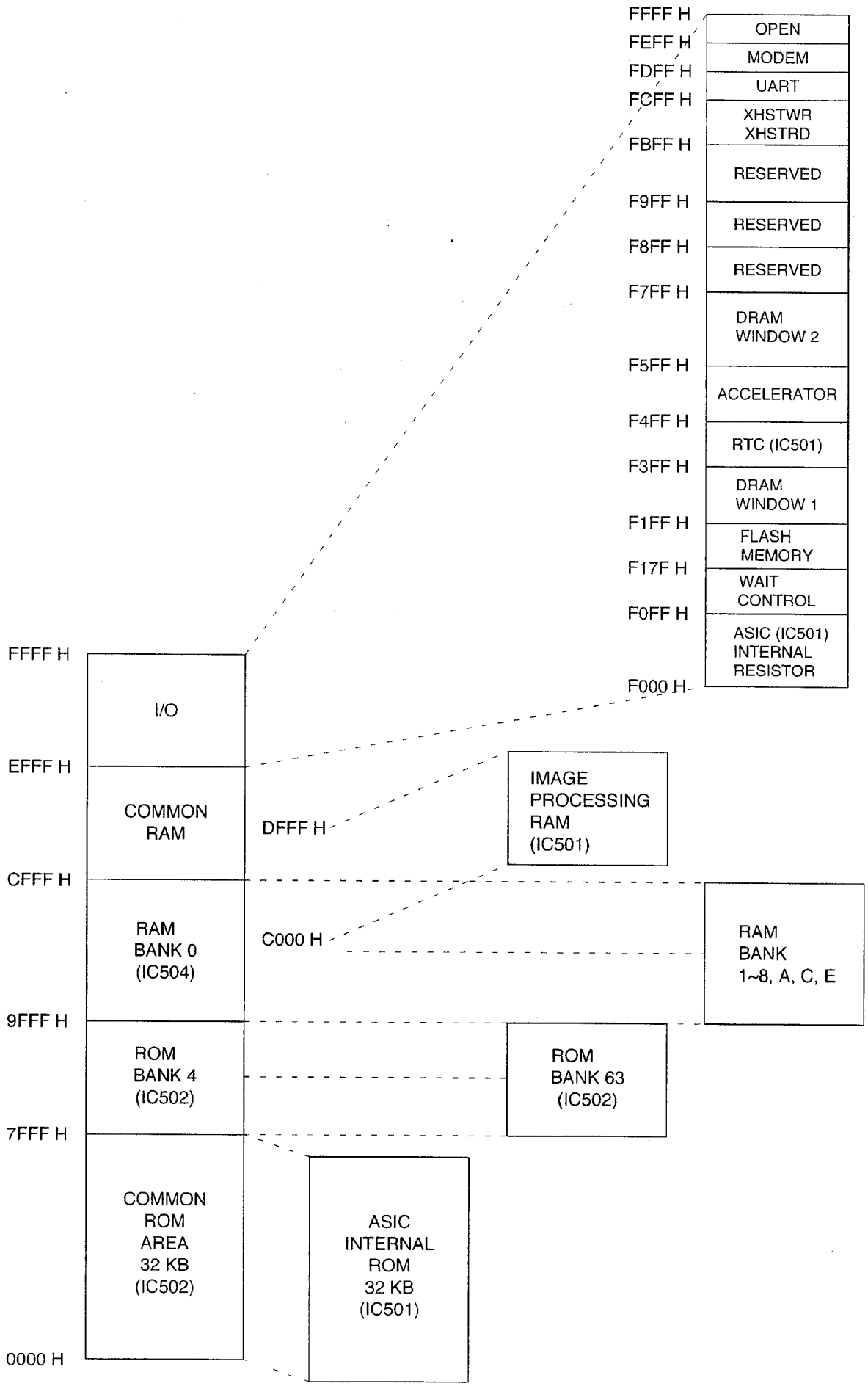


6.3. CONTROL SECTION

6.3.1. BLOCK DIAGRAM



6.3.2. MEMORY MAP



6.3.3. ASIC (IC501)

This custom IC is used for the general FAX operations.

1. CPU:

   This model uses a Z80 equivalent to the CPU operating at 12 MHz. Most of the peripheral functions are performed by custom-designed LSIs. Therefore, the CPU only works for processing the results.

2. RTC:

   Real Time Clock

3. DECODER:

   Decodes the address.

4. ROM/RAM I/F:

   Controls the SELECT signal of ROM or RAM and the bank switching.

5. CIS I/F:

   Controls the document reading.

6. IMAGE DATA RAM:

   This memory is programmed into the ASIC and uses 8 KB for the image processing. (See Fig. A.*)

7. THERMAL HEAD I/F:

   Transmits the recorded data to the thermal head.

8. MOTOR I/F:

   Controls the transmission motor which feeds the document.

   Controls the receiving motor which feeds the recording paper.

9. OPERATION PANEL I/F:

   Serial interface with Operation Panel.

10. I/O PORT:

    I/O Port Interface.

11. ANALOG UNIT:

    Electronic volume for the handset and the monitor.

    Sends beep tones, etc.

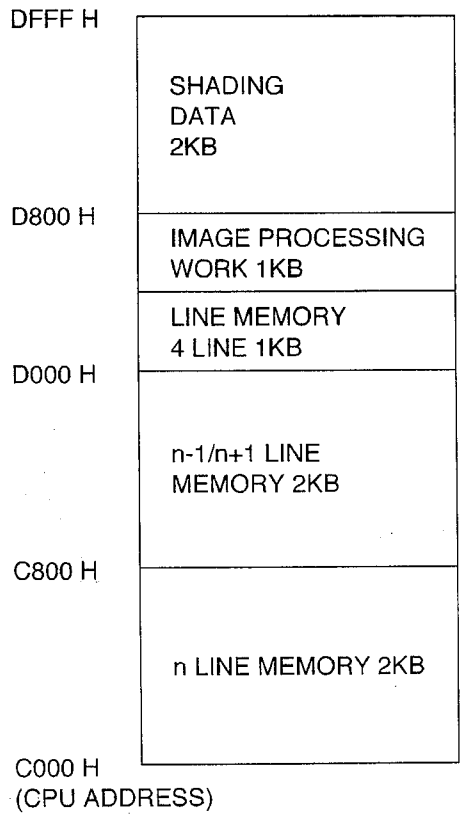


Fig. A

Note*:

This memory is incorporated into the ASIC (IC501) and used for the image processing.

Fig. A shows the memory map of the Image Data RAM.

6.3.4. ROM (IC502)

This 512KB ROM (EPROM or MASKROM) carries a common area of 32KB and bank areas which each have 8KB (BK4~BK63). The addresses from 0000H to 7FFFH are for the common area and from 8000H to 9FFFH are for the bank areas.

6.3.5. STATIC RAM (IC504)

This 32KB RAM carries a common area of 8KB and bank areas which each have 12KB. The addresses from 0000H to EFFFH are for the common area and from A000H to CFFFH are for the bank area.

6.3.6. DYNAMIC RAM (IC503)

The DRAM serves as CPU and receives memory.

The address is F200H~F3FFH (DRAM access window 1) and F600H~F7FFH (DRAM access window 2).

KX-FP121

Descriptions of Pin Distribution (IC501)

NO.	SIGNAL	I/O	POWER SUPPLIED VOLTAGE	DESCRIPTION
1	AIN1	A	3.3V	CCD IMAGE SIGNAL INPUT
2	AIN2	A	3.3V	THERMISTOR TEMPERATURE WATCH INPUT
3	AIN3	A	3.3V	----------
4	AMON	A	3.3V	ANALOG SIGNAL MONITOR TERMINAL
5	VSSB		GND	POWER SOURCE (ANALOG GND)
6	VDDB		3.3V	POWER SOURCE (ANALOG +3.3V)
7	VDD(3.3V/B)		3.3V/BATT	POWER SOURCE (+3.3V/LITHIUM BATTERY)
8	X32OUT	O	3.3V/BATT	RTC (32.768KHz) CONNECTION
9	X32IN	I	3.3V/BATT	RTC (32.768KHz) CONNECTION
10	VSS		GND	GND
11	XBACEN	I	5V/BATT	BACKUP ENABLE
12	VDD (5V/B)		5V/BATT	POWER SOURCE (+5V/LITHIUM BATTERY)
13	XRAMCS	O	5V/BATT	RAM (IC504) CHIP SELECT
14	XRAMCS2	O	5V/BATT	----------
15	FTG	O	5V	SH SIGNAL OUTPUT FOR CIS
16	F1	O	5V	01 SIGNAL OUTPUT FOR CIS
17	F2/OP	O	5V	OUTPUT PORT (LINE TX EN)
18	FR/OP	O	5V	OUTPUT PORT (RESERVED)
19	VIDRST/IOP	O	5V	OUTPUT PORT (PCTL)
20	SPHCLK/IOP	I	5V	INPUT PORT (PDET)
21	DARKON/IOP	I	5V	INPUT PORT (JOG1)
22	ADSEL2/IOP	I	5V	INPUT PORT (JOG2)
23	CPC	I	5V	INPUT PORT (T/P)
24	BELL	O	5V	OUTPUT PORT (LINE RLY)
25	VDD (5V)		5V	POWER SOURCE (+5V)
26	VSS		GND	POWER SOURCE (GND)
27	RVN	I	5V	INPUT PORT (FILM END SENSOR SIGNAL)
28	IRDATXD/IOP	O	5V	OUTPUT PORT (RESERVED)
29	IRDARXD/ IOP80	I	5V	INPUT PORT (MDL SEL)
30	TXD/IOP	O	5V	OUTPUT PORT (RESERVED)
31	RXD/IOP	O	5V	OUTPUT PORT (RESERVED)
32	XRTS/IOP	O	5V	OUTPUT PORT (RESERVED)
33	XCTS/IOP	O	5V	OUTPUT PORT (RESERVED)
34	XDSR/IOP	O	5V	OUTPUT PORT (RESERVED)
35	DCD/IOP	O	5V	OUTPUT PORT (RESERVED)
36	XDTR/IOP	O	5V	OUTPUT PORT (RESERVED)
37	RI/CLK/IOP	O	5V	----------
38	TONE1		5V	TONE OUTPUT
39	TONE2		5V	TONE OUTPUT
40	VOLUREF		5V	ANALOG REF VOLTAGE
41	VOLUOUT		5V	VOLUME OUTPUT
42	VOLUIN		5V	VOLUME INPUT
43	MIDAT/IOP	A	5V	OUTPUT PORT (DTMF EN)
44	MICLK/IOP	A	5V	OUTPUT PORT (TONE1 EN)
45	MILAT/IOP	A	5V	OUTPUT PORT (VOLOUT HS)
46	XRESCS1	O	5V	OUTPUT PORT (BREAK)
47	IOP90	O	5V	OUTPUT PORT (SPMUTE)
48	VSS		GND	POWER SOURCE (GND)
49	VDD (5V)		5V	POWER SOURCE (+5V)
50	XNMI	I	5V	HIGH FIXED
51	CBUSY2	O	5V	RESERVED
52	CSO	O	5V	RESERVED
53	CBUSY1	I	5V	RESERVED
54	CCLK	I	5V	RESERVED
55	CSI	I	5V	RESERVED
56	IOP91	O	5V	OUTPUT PORT (VOLOUT SP)
57	IOP92	O	5V	OUTPUT PORT (C-IDEN)
58	FMEMCS/IOP	O	5V	OUTPUT PORT (FCS)
59	FMEMDO/IOP	O	5V	OUTPUT PORT (ALE)
60	FMEMDI/IOP	O	5V	OUTPUT PORT (CLE)
61	FMEMCLK/IOP	I	5V	INPUT PORT (R/B)
62	XRESCS3/OP	O	5V	OUTPUT PORT (OP RESET)
63	20KOSC/IOP	O	5V	RESERVED

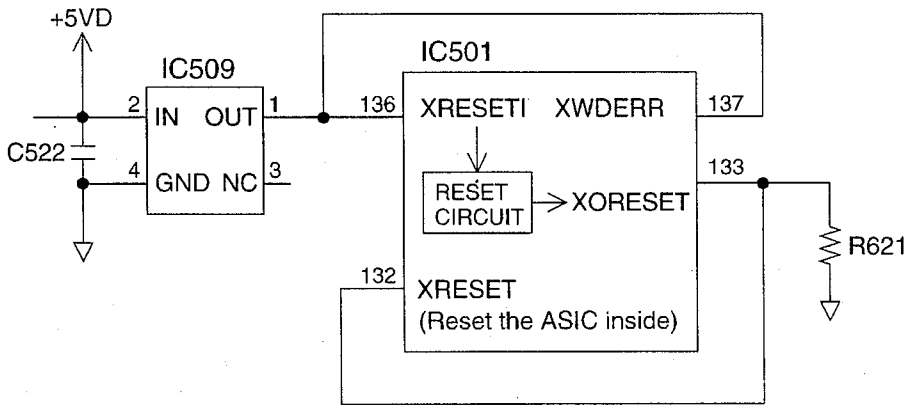
NO.	SIGNAL	I/O	POWER SUPPLIED VOLTAGE	DESCRIPTION
64	XHOLDAK	O	5V	NOT USED
65	VDD (3.3V)		3.3V	POWER SOURCE (+3.3V)
66	XOUT	O	3.3V	SYSTEM CLOCK (24MHz)
67	XIN	I	3.3V	SYSTEM CLOCK (24MHz)
68	VSS		GND	POWER SOURCE (GND)
69	VDD (5V)		5V	POWER SOURCE (+5V)
70	XTEST	O	5V	24MHz CLOCK
71	CPUCLK	O	5V	NOT USED
72	TEST1	I	5V	HIGH FIXED
73	TEST2	I	5V	HIGH FIXED
74	TEST3	I	5V	HIGH FIXED
75	TEST4	I	5V	HIGH FIXED
76	XMDMINT	I	5V	MODEM INTERRUPT
77	XMDMCS	O	5V	MODEM CHIP SELECT
78	VSS		GND	POWER SOURCE (GND)
79	VDD (3.3V)		3.3V	POWER SOURCE (3.3V)
80	XWAIT	I	5V	LOW FIXED
81	HOLD	I	5V	LOW FIXED
82	HSTRD/IOP	O	5V	FLASH MEMORY READ
83	HSTWR/IOP	O	5V	FLASH MEMORY WRITE
84	XOPRBE	O	5V	NOT USED
85	ADR15	O	5V	CPU ADDRESS BUS 15 (NOT USED)
86	ADR14	O	5V	CPU ADDRESS BUS 14 (NOT USED)
87	ADR13	O	5V	CPU ADDRESS BUS 13 (NOT USED)
88	XRAS/IOP	O	5V	DRAM (IC503) ROW ADDRESS STROBE
89	XCAS1/IOP	O	5V	DRAM (IC503) CULUM ADDRESS STROBE
90	XCAS2/IOP	O	5V	OUTPUT PORT (MODRST)
91	VSS		GND	POWER SOURCE (GND)
92	VDD (3.3V)		3.3V	POWER SOURCE (3.3V)
93	XRESCS2	O	5V	OUTPUT PORT (CSBR)
94	DB3	I/O	5V	CPU DATA BUS 3
95	DB2	I/O	5V	CPU DATA BUS 2
96	DB4	I/O	5V	CPU DATA BUS 4
97	DB1	I/O	5V	CPU DATA BUS 1
98	DB5	I/O	5V	CPU DATA BUS 5
99	DB0	I/O	5V	CPU DATA BUS 0
100	DB6	I/O	5V	CPU DATA BUS 6
101	DB7	I/O	5V	CPU DATA BUS 7
102	VSS		GND	POWER SOURCE (GND)
103	VDD (5V)		5V	POWER SOURCE (5V)
104	XROMCS	I/O	5V	ROM (IC502) CHIP SELECT
105	RD	O	5V	CPU RD
106	WR	O	5V	CPU WR
107	ADR0	O	5V	CPU ADDRESS BUS 0
108	ADR1	O	5V	CPU ADDRESS BUS 1
109	ADR2	O	5V	CPU ADDRESS BUS 2
110	ADR3	O	5V	CPU ADDRESS BUS 3
111	ADR4	O	5V	CPU ADDRESS BUS 4
112	ADR5	O	5V	CPU ADDRESS BUS 5
113	ADR6	O	5V	CPU ADDRESS BUS 6
114	ADR7	O	5V	CPU ADDRESS BUS 7
115	ADR8	O	5V	CPU ADDRESS BUS 8
116	ADR9	O	5V	CPU ADDRESS 9
117	ADR10	O	5V	CPU ADDRESS 10
118	ADR11	O	5V	CPU ADDRESS 11
119	ADR12	O	5V	CPU ADDRESS 12
120	VSS		GND	POWER SOURCE (GND)
121	VDD (5V)		5V	POWER SOURCE (+5V)
122	RBA0	O	5V	ROM/RAM BANK ADDRESS 0
123	RBA1	O	5V	ROM/RAM BANK ADDRESS 1
124	RBA2	O	5V	ROM/RAM BANK ADDRESS 2
125	RBA3	O	5V	ROM/RAM BANK ADDRESS 3
126	RBA4	O	5V	ROM/RAM BANK ADDRESS 4
127	RBA5	O	5V	ROM/RAM BANK ADDRESS 5
128	RBA6/IOP96	O	5V	OUTPUT PORT (S/ENB)
129	IOP95	O	5V	OUTPUT PORT (SEN LED ON)
130	IOP94	O	5V	OUTPUT PORT (RESERVER)

NO.	SIGNAL	I/O	POWER SUPPLIED VOLTAGE	DESCRIPTION
131	IOP93	I	5V	OUTPUT PORT (CIS LED ON)
132	XRESET	I	5V	RESET INPUT
133	XORESET	O	5V	RESET OUTPUT
134	VDD (5V)		5V	POWER SOURCE (+5V)
135	VSS		GND	POWER SOURCE (GND)
136	XRESETI	I	5V	RESET INPUT
137	WDERR	O	5V	WATCHED ERROR OUTPUT SIGNAL
138	XRSTSWI	I	5V	INPUT PORT (MPOS)
139	XRSTSWO	O	5V	OUTPUT PORT (VOLIN SEL2)
140	XRESETO	O	5V	NOT USED
141	IOP	O	5V	THERMAL HEAD POWER ON/OFF CONTROL
142	STB1	O	5V	STROBE SIGNAL OUTPUT TO THERMAL HEAD
143	STB2	O	5V	STROBE SIGNAL OUTPUT TO THERMAL HEAD
144	VDD (3.3V)		3.3V	POWER SOURCE (3.3V)
145	VSS		GND	POWER SOURCE (GND)
146	STB3	O	5V	STROBE SIGNAL OUTPUT TO THERMAL HEAD
147	STB4	O	5V	NOT USED
148	STBNP	I	5V	INPUT PORT (CPC)
149	THDAT	O	5V	RECORDED IMAGE OUTPUT
150	THCLK	O	5V	CLOCK OUTPUT FOR DATA TRANSFER
151	THLAT	O	5V	PULSE OUTPUT FOR DATA LATCH
152	RM0/IOP	I	5V	INPUT PORT (P-TOP)
153	RM1/IOP	I	5V	INPUT PORT (DCN)
154	RM2/IOP	I	5V	INPUT PORT (CPC)
155	RM3/IOP	O	5V	OUTPUT PORT (VOLIN SEL1)
156	RXE/IOP	I	5V	INPUT PORT (NOT USED)
157	TMO	O	5V	MOTOR A PHASE
158	VDD (5V)		5V	POWER SOURCE (+5V)
159	VSS		GND	POWER SOURCE (GND)
160	TM1/IOP	O	5V	MOTOR B PHASE
161	TM2/IOP	O	5V	MOTOR /A PHASE
162	TM3/IOP	O	5V	MOTOR /B PHASE
163	TXE/IOP	O	5V	MOTOR ENABLE SIGNAL
164	KSTART	O	5V	OPERATION PANEL CONTROL
165	KLATCH	O	5V	OPERATION PANEL CONTROL
166	KSCLK	O	5V	OPERATION PANEL CONTROL
167	KTXD	O	5V	OPERATION PANEL CONTROL
168	KRXD	I	5V	OPERATION PANEL CONTROL
169	ADSEL1	O	5V	CHANNEL SELECT SIGNAL FOR AIN2
170	VSSC		GND	POWER SOURCE (ANALOG GND)
171	VDDC		3.3V	POWER SOURCE (ANALOG +3.3V)
172	VSSA		GND	POWER SOURCE (ANALOG GND)
173	VDDA		3.3V	POWER SOURCE (ANALOG +3.3V)
174	VREFB	A	3.3V	A/D CONVERTER'S ZERO STANDARD VOLTAGE OUTPUT
175	VCL	A	3.3V	ANALOG PART STANDARD VOLTAGE SIGNAL
176	VREFT	A	3.3V	A/D CONVERTER'S FULL SCALE VOLTAGE OUTPUT

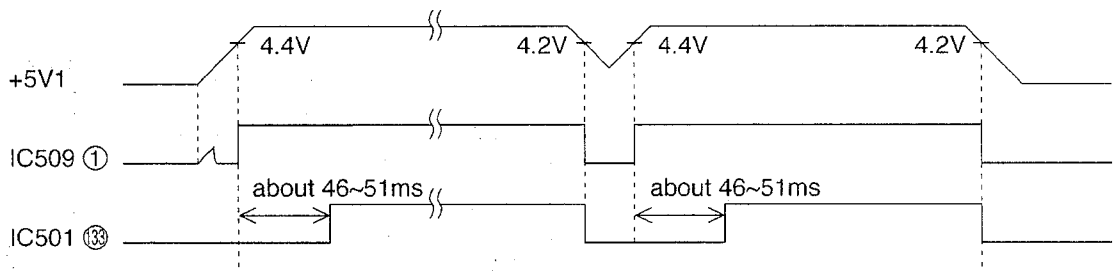
6.3.7. RESET CIRCUIT (WATCH DOG TIMER)

The output signal from pin 1 of the voltage detect IC (IC509) is input to the ASIC (IC501) 136 pin. Then the output signal from pin 133 of the ASIC (IC501) resets the ASIC.

Circuit Diagram



1. During a momentary power interruption, a positive reset pulse of 46~51 msec is generated and the system is reset completely.



2. When pin 132 and 133 of IC501 become low level, they will prohibit the SRAM (IC503) from changing data.
   The SRAM (IC504) will go into the backup mode, when they are backed up by a lithium battery.
3. The watch dog timer, built-in the ASIC (IC501), is initialized by the CPU about every 1.5 ms.
   When a watch dog error occurs, pin 137 of the ASIC (IC501) becomes low level.
   The terminal of the $\overline{\text{WDERR}}$ signal is connected to the reset line, so the $\overline{\text{WDERR}}$ signal works as the reset signal.

6.3.8. SRAM AND RTC BACKUP CIRCUIT

1. **Function**

This unit has a lithium battery (BATT) which works for the SRAM (IC504) and Real Time Clock IC (RTC: inside IC501).

The user parameters for autodial numbers, the system setup data and others are stored in the SRAM (IC504).

The RTC continues to work, backed up by a lithium battery even when the power switch is OFF.

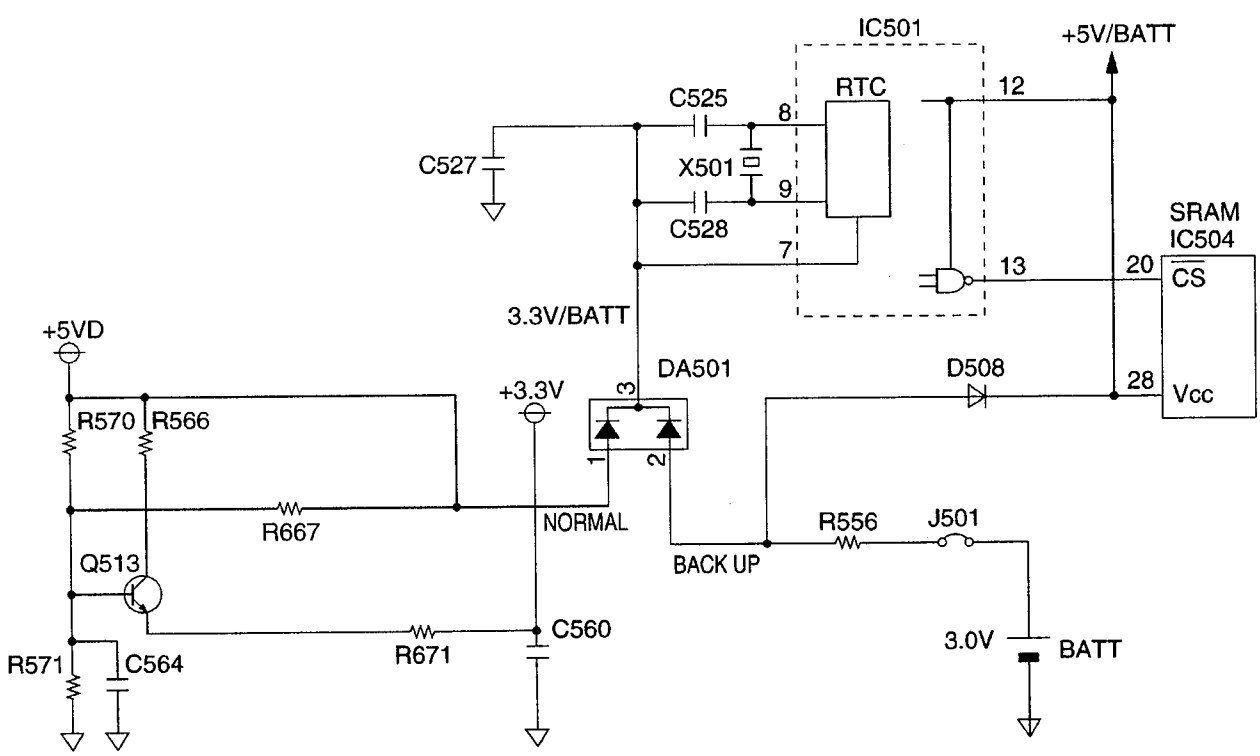
2. **SRAM (IC504) Backup Circuit Operation**

When the power switch is turned ON, power is supplied through pin 12 of IC501 to the SRAM (IC504). At this time, the voltage at pin 28 of the SRAM is 5V. When the power switch is turned OFF, the BATT supplies power to the SRAM through J501, R556 and D508. The voltage at pin 28 of the SRAM is about +2.5V. When the power switch is OFF and the voltage of +5V decreases, the voltage detect IC (IC509) outputs "Low " level and the IC501 outputs the reset signal. Pin 28 of the SRAM becomes roughly the same voltage as the battery voltage. At this point, pin 20 (CS) of IC504 becomes high level, causing the SRAM to go into the backup mode, in which the power consumption is lower.

3. **RTC Inside (IC501) Backup Circuit Operation**

When the power switch is turned ON, power is supplied through DA501 to the RTC (inside IC501). At this time, the voltage at pin 7 of the IC501 is +3.3V. When the power switch is turned OFF, the BATT supplies power to RTC through DA501. Thevoltage at pin 7 of IC501 is about +2.5V. When the power switch is OFF and the voltage of +3.3V decreases, pin 7 of RTC (IC501) becomes roughly the same voltage as the battery voltage. RTC goes into the backup mode, in which the power consumption is lower.

Circuit Diagram



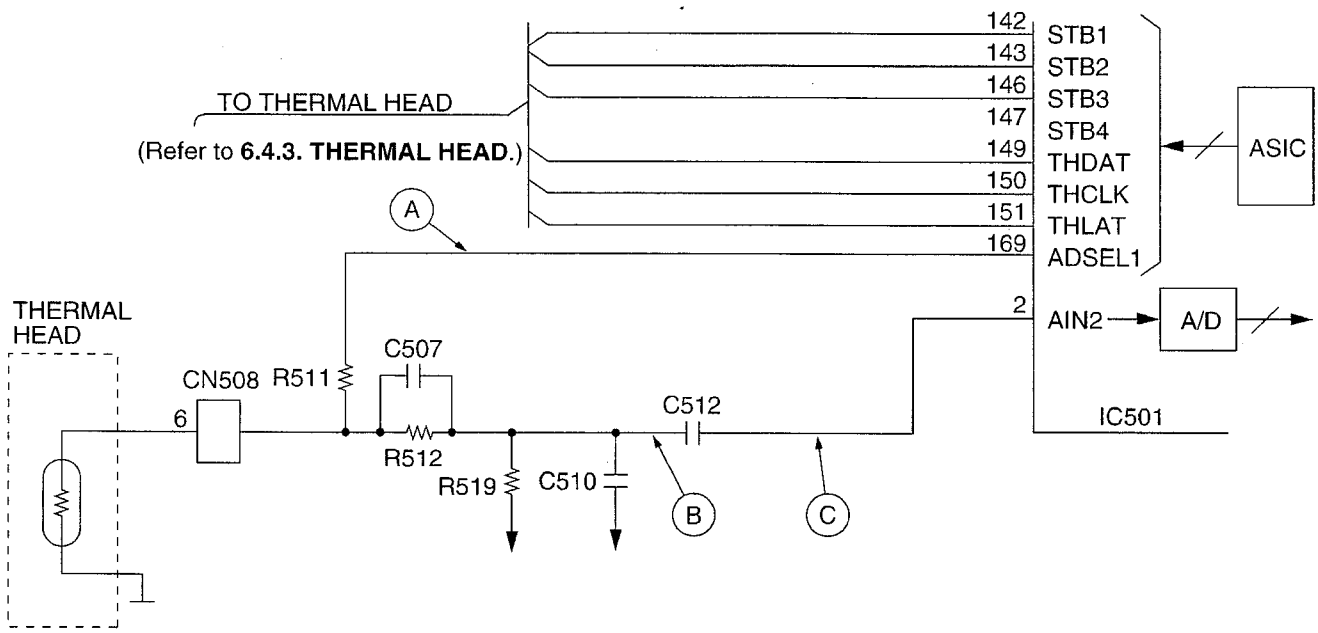
6.3.9. SUPERVISION CIRCUIT FOR THE THERMAL HEAD TEMPERATURE

1. **Function**

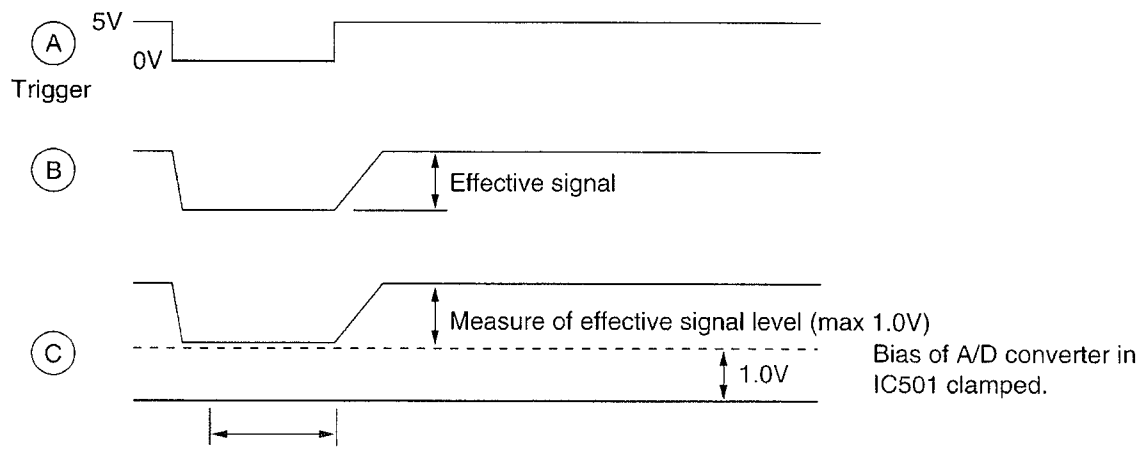
The thermistor changes the resistor according to the temperature and uses the thermistor's characteristics. The output of pin 153 of IC501 becomes a low level. Then when it becomes a high level, it triggers point Ⓐ. In point Ⓒ, according to the voltage output time, the thermal head's temperature is detected.

After the thermal head temperature is converted to voltage in Ⓑ, it is then changed to digital data in the A/D converter inside IC501. The CPU decides the strobe width of the thermal head according to this value. Therefore, this circuit can keep the thermal head at an even temperature in order to stabilize the printing density and prevent the head from being overheated.

Circuit Diagram



Timing Chart



Input (AIN2) is reset once to obtain reference.

6.4. FACSIMILE SECTION

6.4.1. IMAGE DATA FLOW DURING FACSIMILE OPERATION

COPY (Fine, Super-Fine, Half Tone)

1. Line information is read by CIS (to be used as the reference white level) via route ① , and is input to IC501. Refer to **6.4.2. Block Diagram**.
2. In IC501, the data is adjusted to a suitable level for A/D conversion in the Analog Signal Processing Section, and via route ② it is input to A/D conversion (8 bit). After finishing A/D conversion, the data is input to the Image Processing Section via route ③ . Then via routes ④ and ⑤ , it is stored in RAM as shading data.
3. The draft's information that is read by CIS is input to IC501 via route ① . After it is adjusted to a suitable level for A/D conversion via route ② , the draft's information is converted to A/D (8 bit), and it is input to the Image Processing Section. The other side, the shading data which flows from RAM via routes ⑥ and ⑦ , is input to the Image Processing Section. After finishing the draft's information image processing, white is regarded as "0" and black is regarded as "1". Then via routes ④ and ⑤ , they are stored in RAM.
4. The white/black data stored as above via routes ⑥ and ⑧ is input to the P/S converter. The white/black data converted to serial data in the P/S converter is input to the Thermal Head via route ⑨ and is printed out on recording paper.

   Note:

   Standard : Reads 3.58 times/mm

   Fine : Reads 7.7 times/mm

   Super-Fine : Reads 15.4 times/mm

Transmission

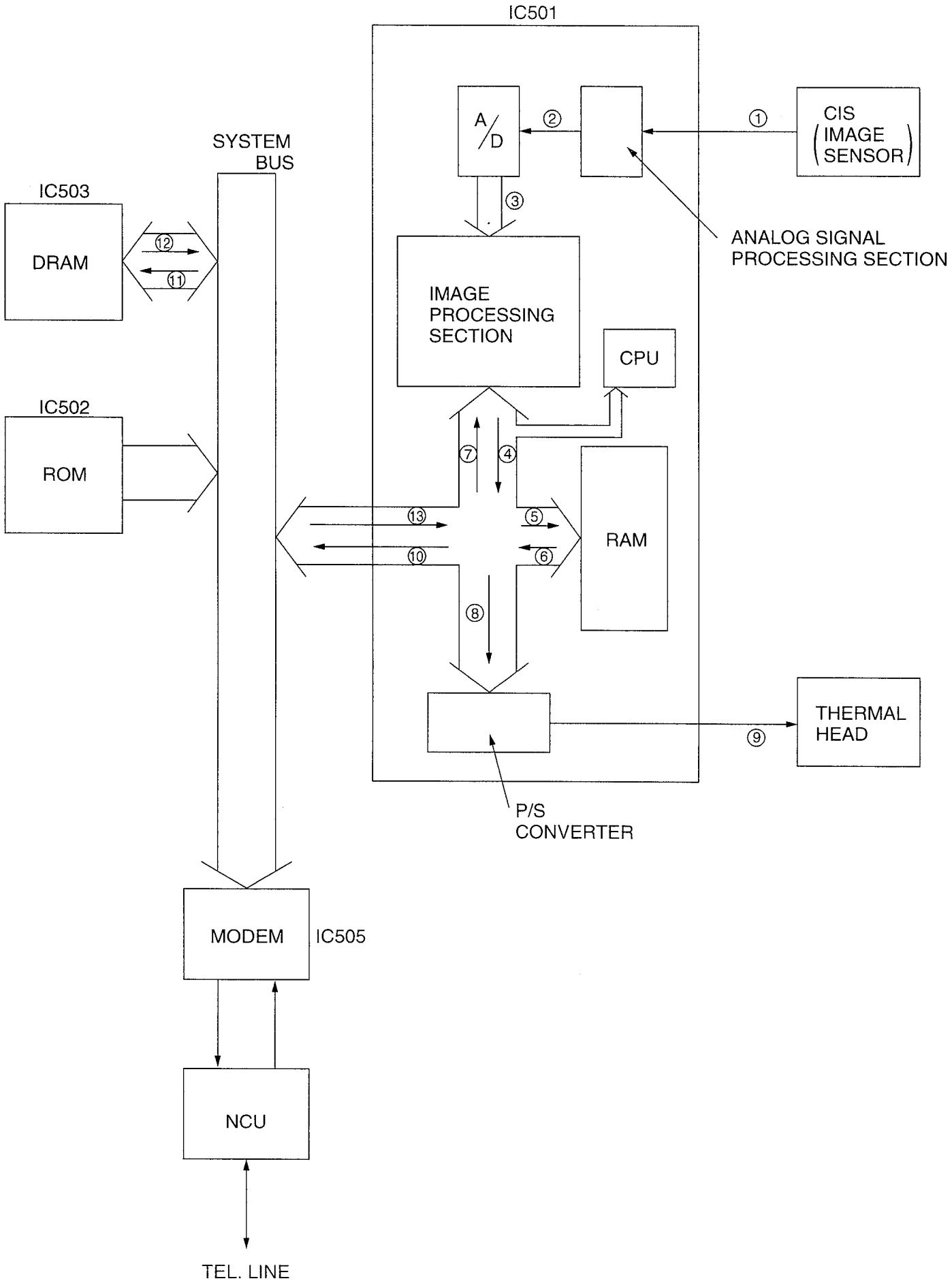
1. Same processing as **COPY** items 1 - 3.
2. The data stored in the RAM of IC501 is output from IC501 via routes ⑥ and ⑩ , and is stored in the system bus.

   Via route ⑪ , it is stored in the communication buffer inside DRAM (IC503).
3. While retreiving data stored in the communication buffer synchronous with the modem, the CPU (inside IC501) inputs the data to the modem along route ⑫ , where it is converted to serial analog data and forwarded over the telephone lines via the NCU Section.

Reception

1. The serial analog image data is received over the telephone lines and input to the modem via the NCU section, where it is demodulated to parallel digital data. Then the CPU (IC501) stores the data in the communication buffer DRAM (IC503) along route ⑫ .
2. The data stored in DRAM (IC503) is decoded by the CPU (IC501) via route ⑫ , and is stored in DRAM (IC503) via routes ⑬ and ⑤ .
3. Same processing as **COPY** item 4.

6.4.2. Block Diagram



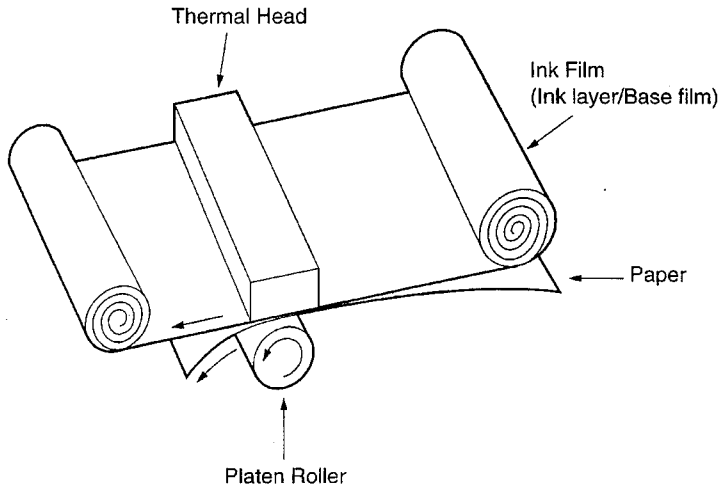
6.4.3. THERMAL HEAD

1. Function

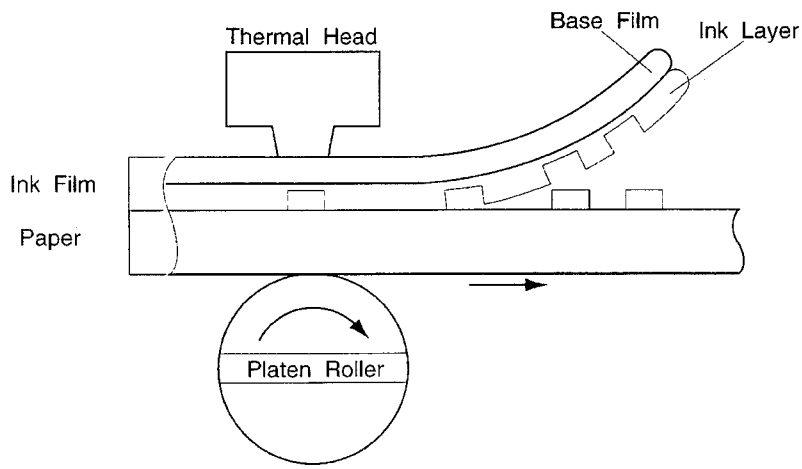
This unit utilizes the state of the art thermal printer technology.

The ink film is chemically processed. The ink film is comprised of two parts: an ink layer and a base film. When the thermalhead contacts this ink film, it emits heat momentarily, and the ink layer is melted and transferred to the paper. If this continues, letters and/or diagrams appear, and the original document is reproduced.

COMPOSITION OF THE RECEIVE RECORD SECTION (THERMAL RECORDING FORMAT)



Thermal Transfer



2. Circuit Operation

Refer to the block diagram and the timing chart on the following page.

There are 27 driver ICs aligned horizontally on the thermal head and each one of these ICs can drive 64 heat-emitting registers. This means that one line is at a density of 64x27=1728 dots=(8 dots/mm).

White/Black (white=0, black=1) data in one line increment is synchronized at IC501 pin 150 (THCLK), and sent from IC501 pin 149 (THDAT) to the shift register of the ICs. The shift registers of the 27 ICs are connected in series, and upon the shift of the 1728 dot increment, the shift register becomes filled with data, and a latch pulse is emitted to each IC from IC501 pin 151 (THLAT).

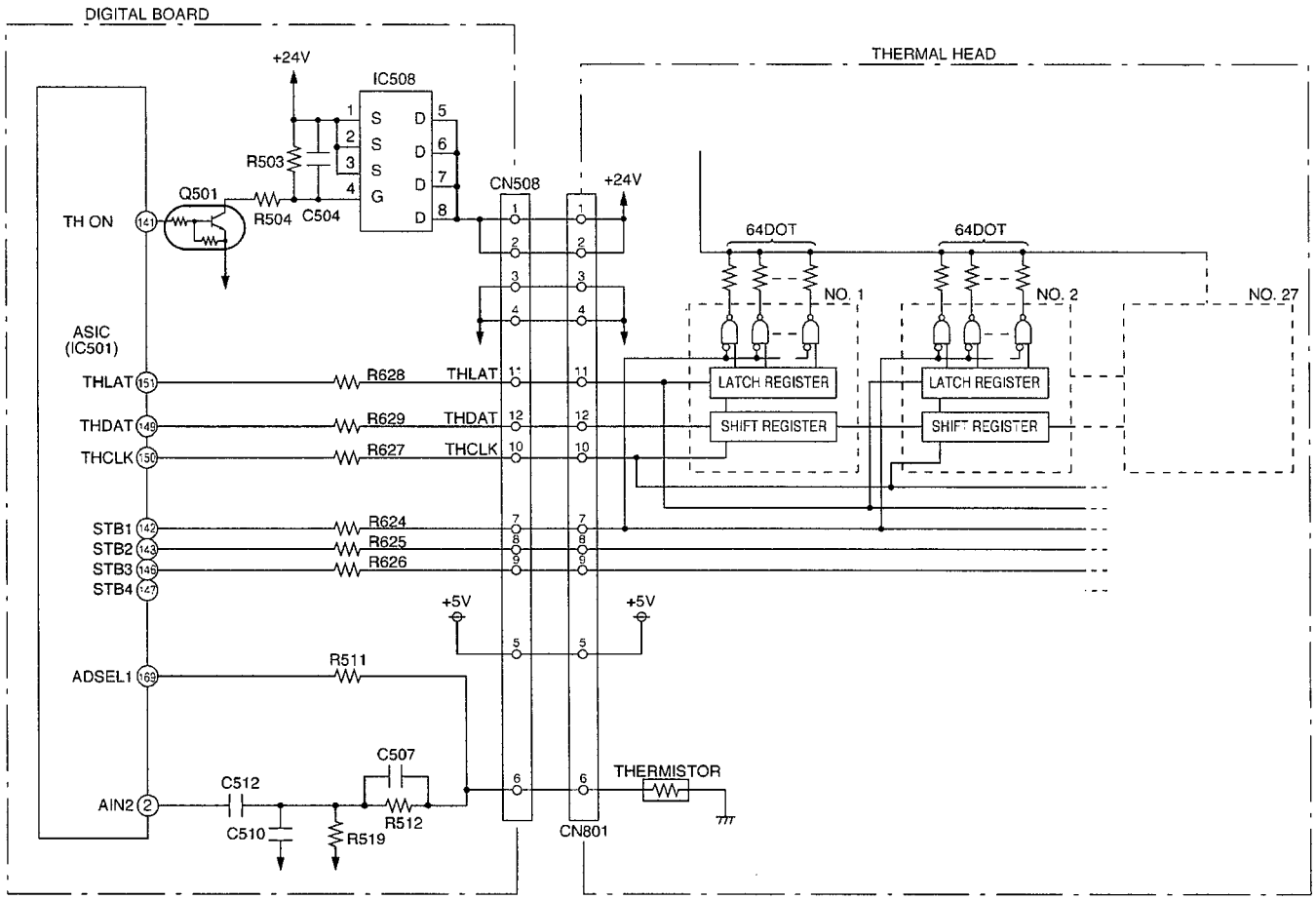
With this latch pulse, all the contents of the shift registers are latched to the latch registers. Thereafter, through the addition of strobes from the IC501 pins (142, 143, 146), only the dot location of black (=1) among latched data activates the driver, and the current passes to heat the emitting body to cause heat emission.

Here, the three line strobes, STB1 to STB3, impress at intervals of 9.216 msec, as required for one-line printout.

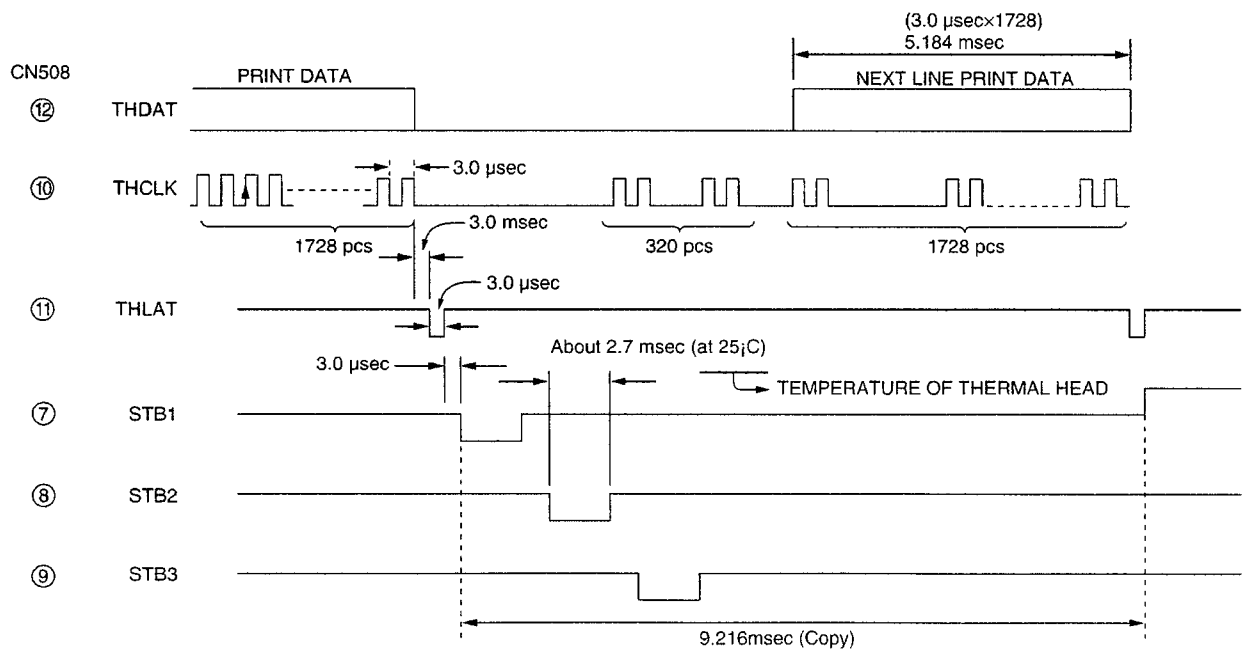
The sequence is shown on the next page. [Moreover, for the strobe width, the thermistor value inside the thermal head is detected according to IC501 pin 2. Depending on that value, the strobe width is recorded in ROM (IC502). Accordingly, the strobe width is determined.]

When the thermal head is not used, the IC501 (141, THON) becomes low , Q501 turns OFF, IC508 turns OFF, and the +24V power supply for the thermal head driver is not impressed to protect the IC.

Circuit Diagram



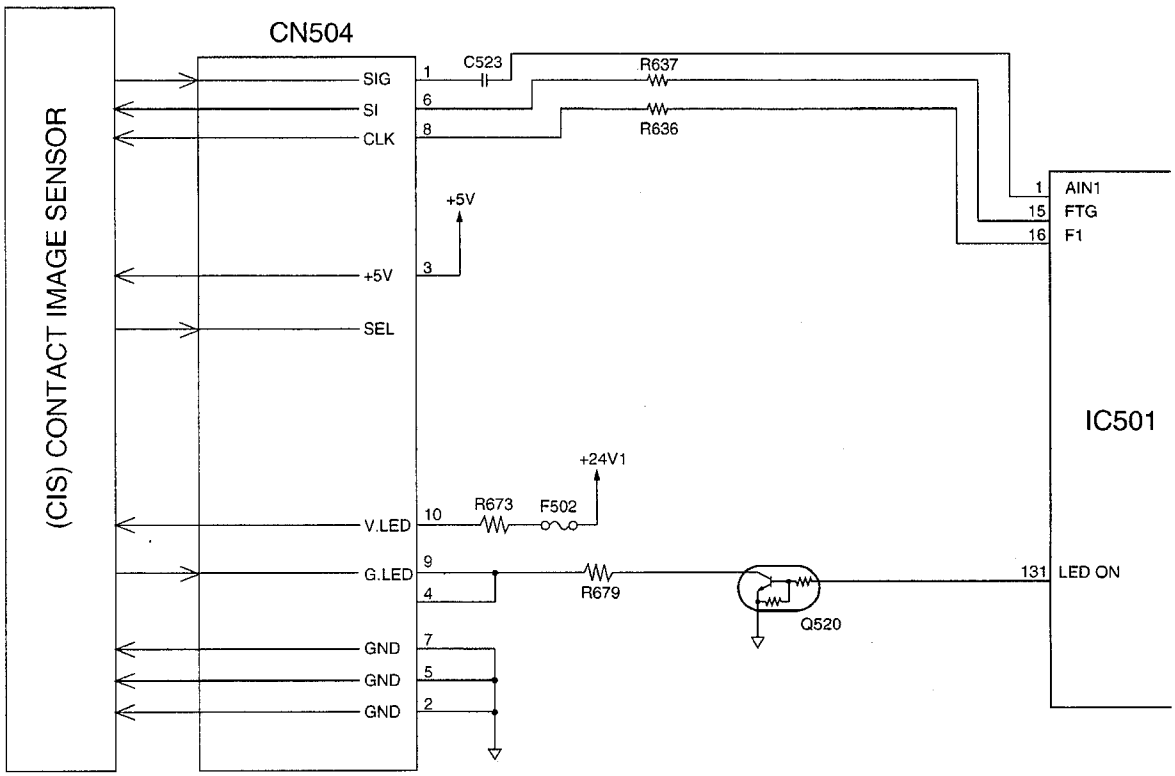
Timing Chart



6.4.4. SCANNING BLOCK

The scanning block of this device consists of a control circuit and a contact image sensor made up of a celfoc lens array, an LED array, and photoelectric conversion elements.

Circuit Diagram



When an original document is inserted and the start button pressed, pin 131 of IC501 goes to a high level and the transistor Q520 turns on.This applies voltage to the LED array to light it. The contact image sensor is driven by each of the FTG-F1 signals output from IC501, and the original image illuminated by the LED array undergoes photoelectric conversion to output an analog image signal (SIG). The analog image signal is input to the system LSI on AIN1 (pin 1 of IC501) and converted into 8-bit data by the A/D converter inside IC501. Then this signal undergoes digital processing in order to obtain a high-quality image.

6.4.5. STEPPING MOTOR DRIVE CIRCUIT

1. **Function**

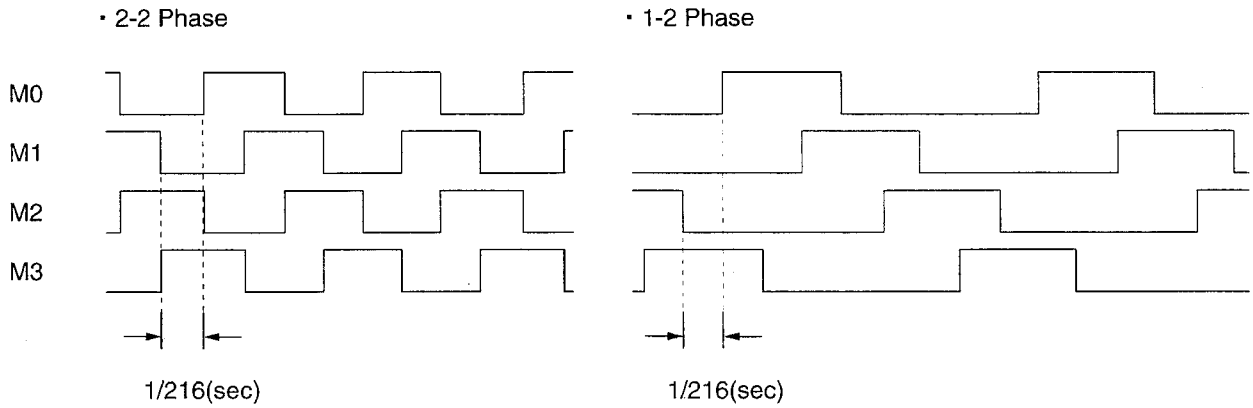
The stepping motor works for both transmission and reception.

2. **Motor**

During motor driving, pin 163 of ASIC IC501 becomes a high level, driver pin 12 of IC506 becomes a low level, and Q519 turns on. As a result, +24V is supplied to the motor coil.

Stepping pulses are output from gate array IC501 pins, 157, 160~162, causing driver IC506 pins, 15~12 to drive the motor coil. The motor coil is energized sequentially in 2 phase increments, which causes a 1-step rotation. A 1-step rotation feeds 0.13 mm of recording paper or document paper.

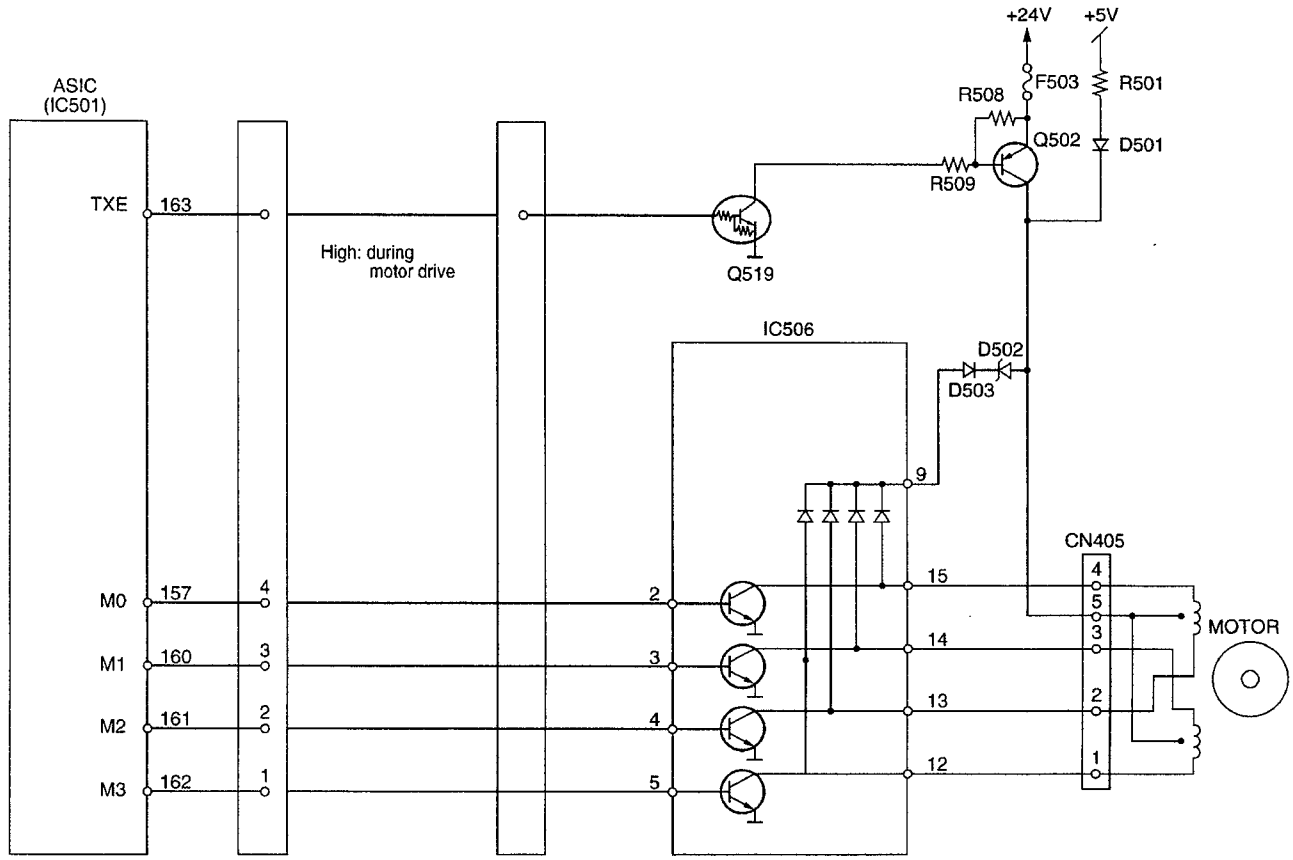
Stepping Monitor Timing Chart



Stepping Motor Drive Mode

Function	Mode	Phase Pattern	Speed
Copy	Fine	1-2	216 pps
FAX	Standard	2-2	216 pps
	Fine or Half tone	1-2	216 pps
Paper Feed	———	2-2	216 pps
Stand-by	———	All phases are currently off.	None

Circuit Diagram



When the motor suspends while it is in the receive mode (about 70~80 msec), pin 163 of ASIC IC501 becomes a low level and Q519 turns off. Then Q502 also turns off, and instead of +24 V, +5 V is supplied through D501 so that the motor is held in place. When the system is in the stand-by mode, all of the motor drive transistors turn off. Consequently the motor current stops.

6.4.6. GEAR SECTION

This model provides a motor-driven gear mechanism for transmitting/copying documents and printing fax data. In this chapter, you will see how the gears work to select and operate a mode and how the gear section, sensors and rollers mechanically work during the main operations (FAX transmission, FAX reception and Copy).

6.4.6.1. Mode Selection (See Fig. 1)

When a motor with Drive Motor Gear attached rotates clockwise (CW), Swing Gear C engages G15 and drives G14 to rotate counterclockwise. This operation provide four mode options (**A:** Transmit mode, **B:** Paper-Pickup mode, **C:** Receive mode and **D:** Copy mode) selected by the Sensor Switch. (The Sensor Switch Lever's position in the CAM (G15) controlled by the software selects a specific mode.) You can see which mode is selected by confirming the Mode Marker's position as shown in Fig. 1-a~1-d.

(Ex. If the Mode Marker is in position **A**, a transmit mode is selected.)

Note:

The arrows show the directions in which the active gears turn around.

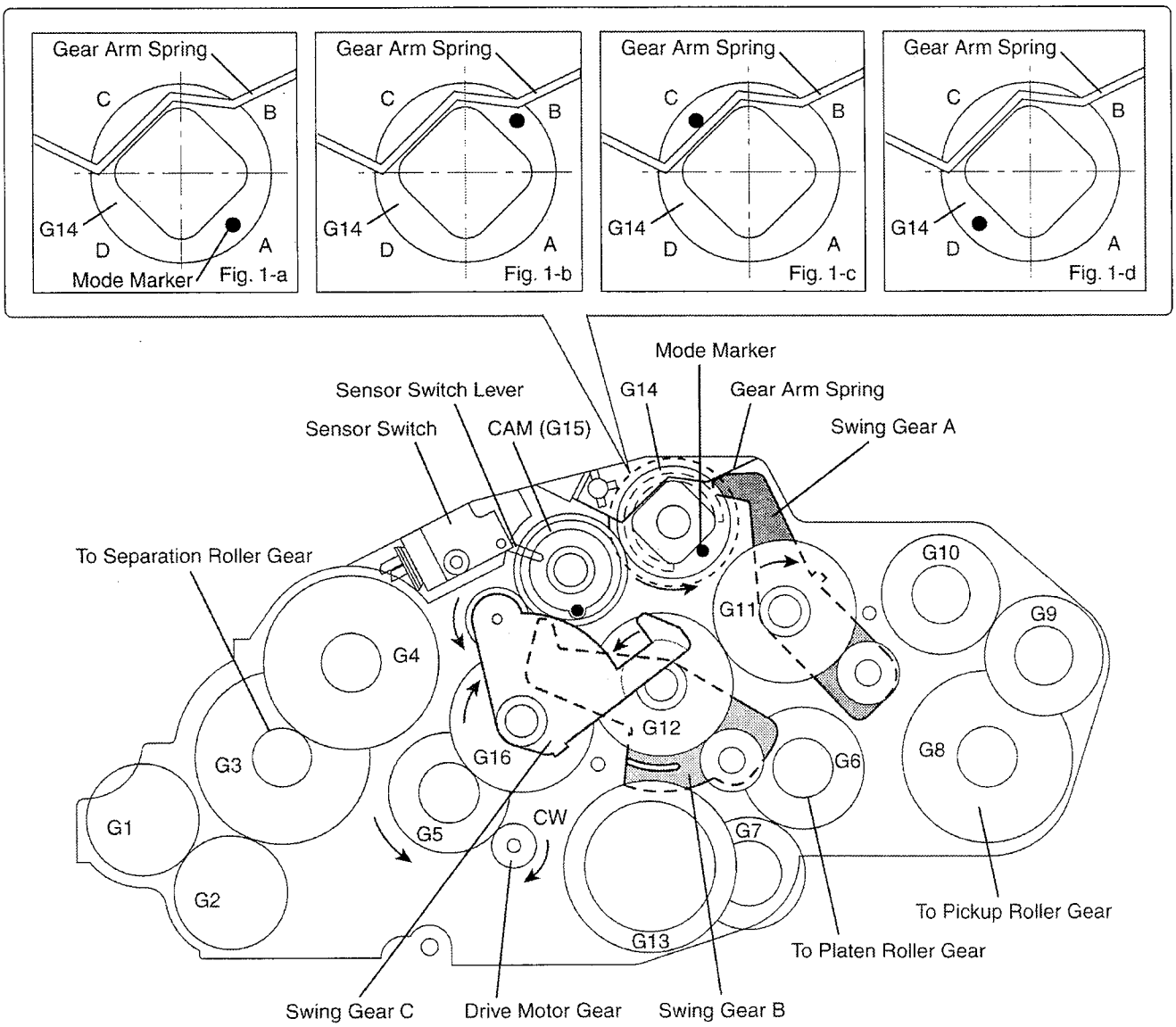


Fig. 1: Mode Selection

6.4.6.2. Mode Operation

Once a mode is selected, the Drive Motor Gear rotates counterclockwise (CCW) and then the controlling positions of Swing Gears A, B and C determine which gears convey their drive power in each mode.

A. Transmit mode (See Fig. A.) :

Swing Gear C engages G4 and conveys its power to the Separation Roller Gear through G3 and sets the Separation Roller for feeding documents.

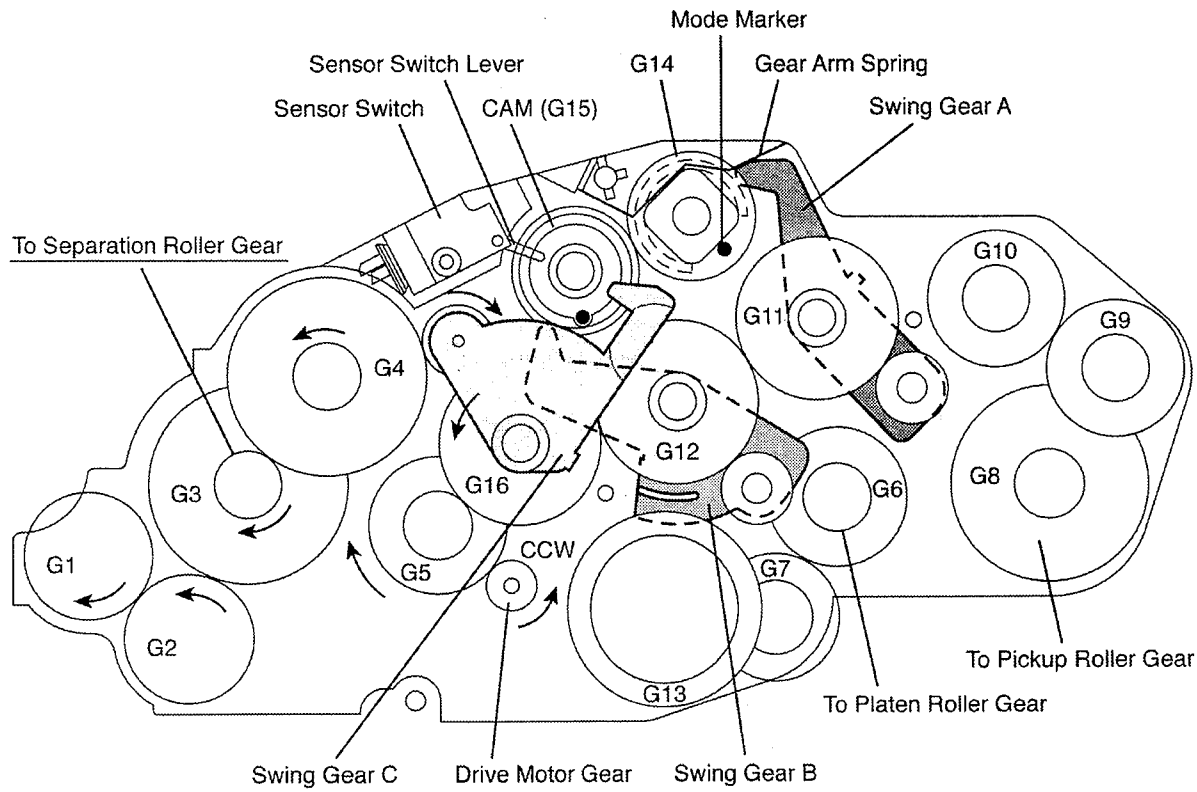


Fig. A: Transmit mode

B. Paper-Pickup mode (See Fig. B) :

Swing Gear A engages G10 and provides its power to the Pickup Roller Gear through G8. The Pickup Roller picks up and pre-feeds a recording paper until the recording paper pushes up the PAPER TOP SENSOR* lever.

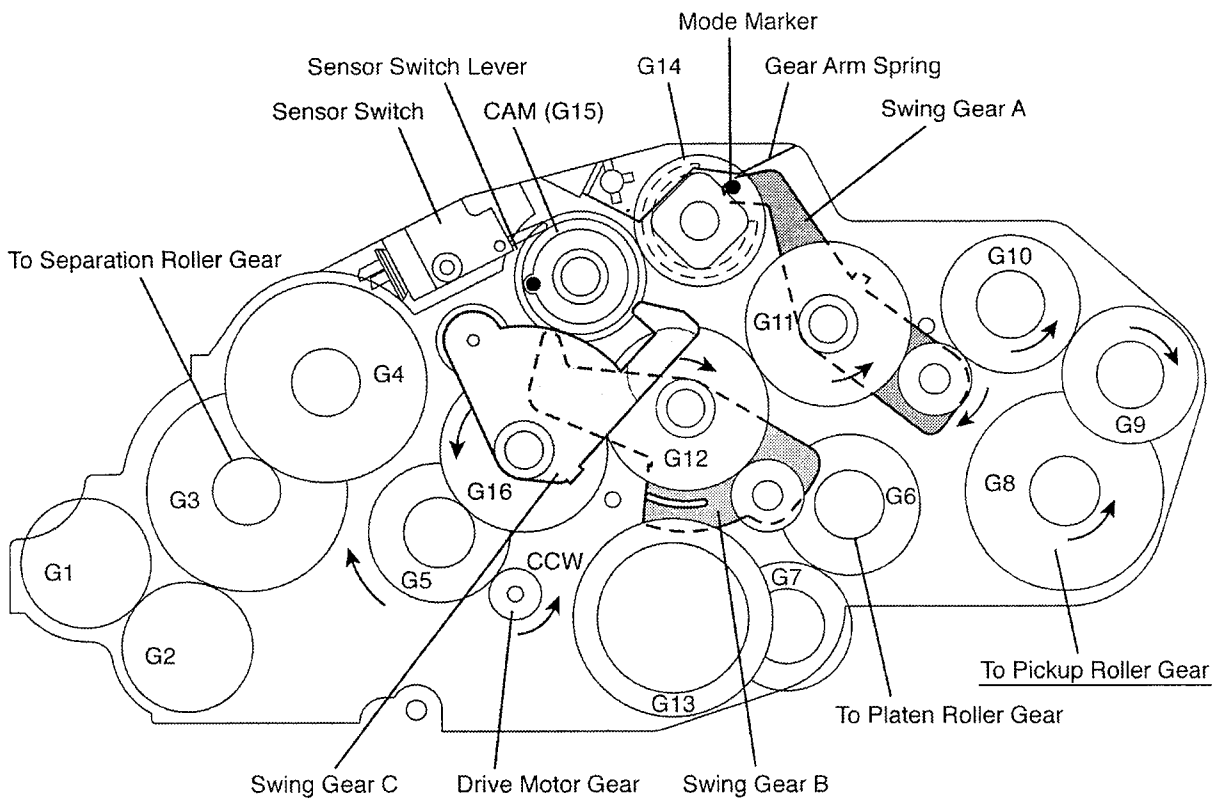


Fig. B: Paper-Pickup mode

Note* :

See **"Sensor Location"** in **6.5. SENSORS AND SWITCHES**.

C. Receive mode (See Fig. C.) :

Swing Gear B engages G13 and conveys its power to the Platen Roller Gear through G6. Then, the Platen Roller feeds recording paper for printing the received data.

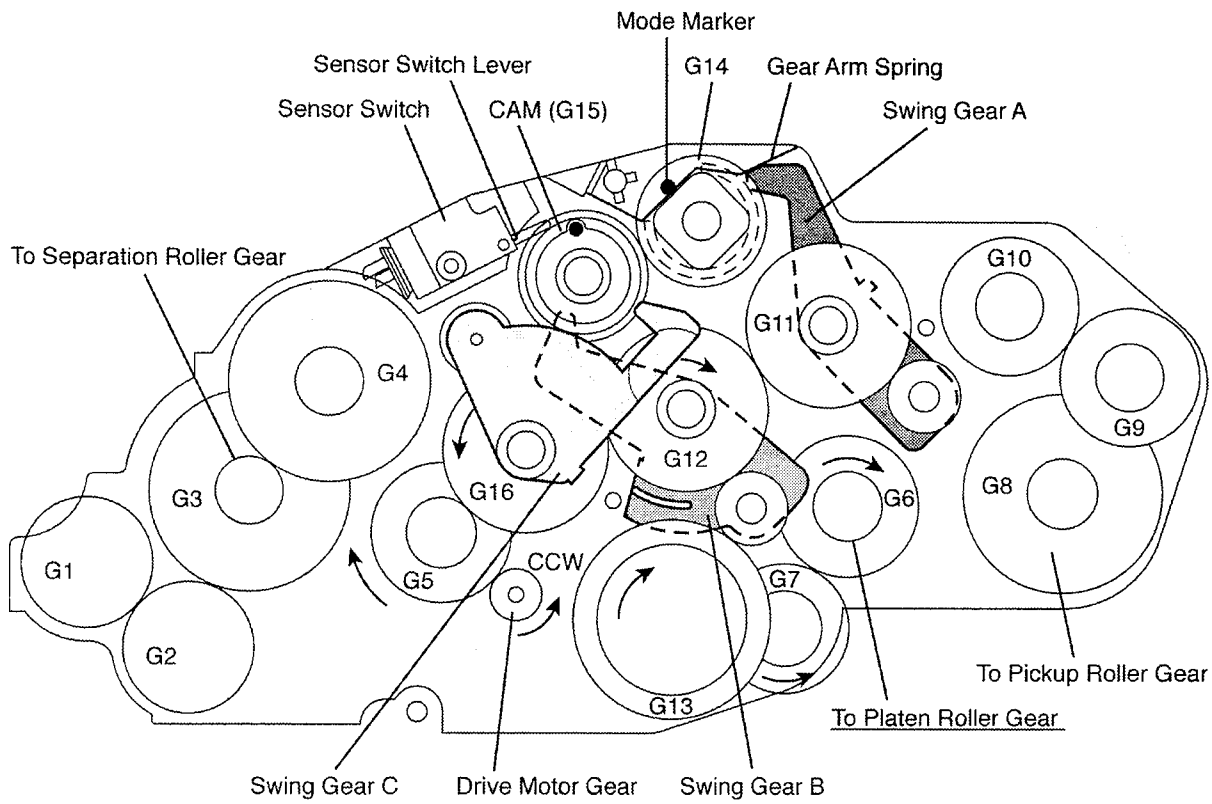


Fig. C: Receive mode

D. Copy mode (See Fig. D.) :

Swing Gears B and C engages G13 and G4 respectively, and then G6 and G3 drive the Pickup Roller Gear and the Separation Roller Gear for feeding recording paper and documents when the unit is in the copy operation.

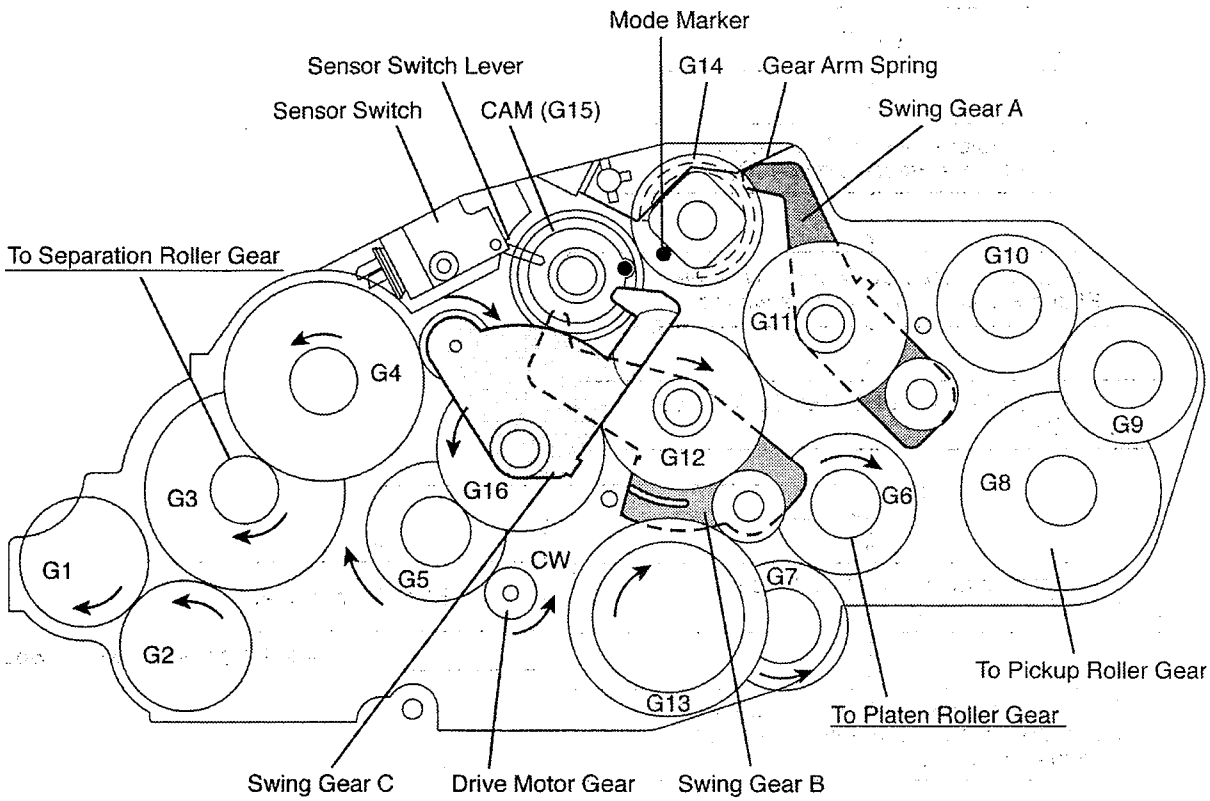
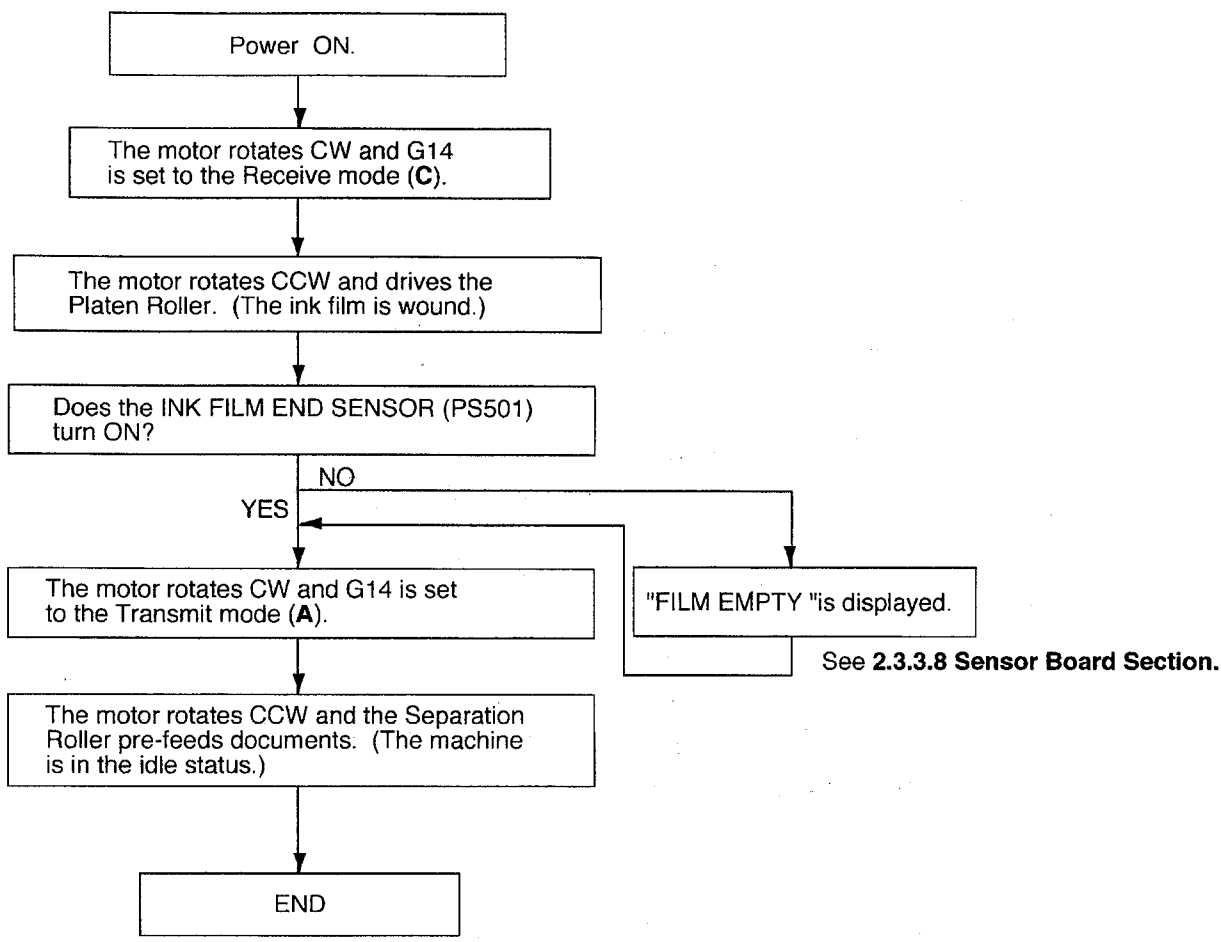


Fig. D: Copy mode

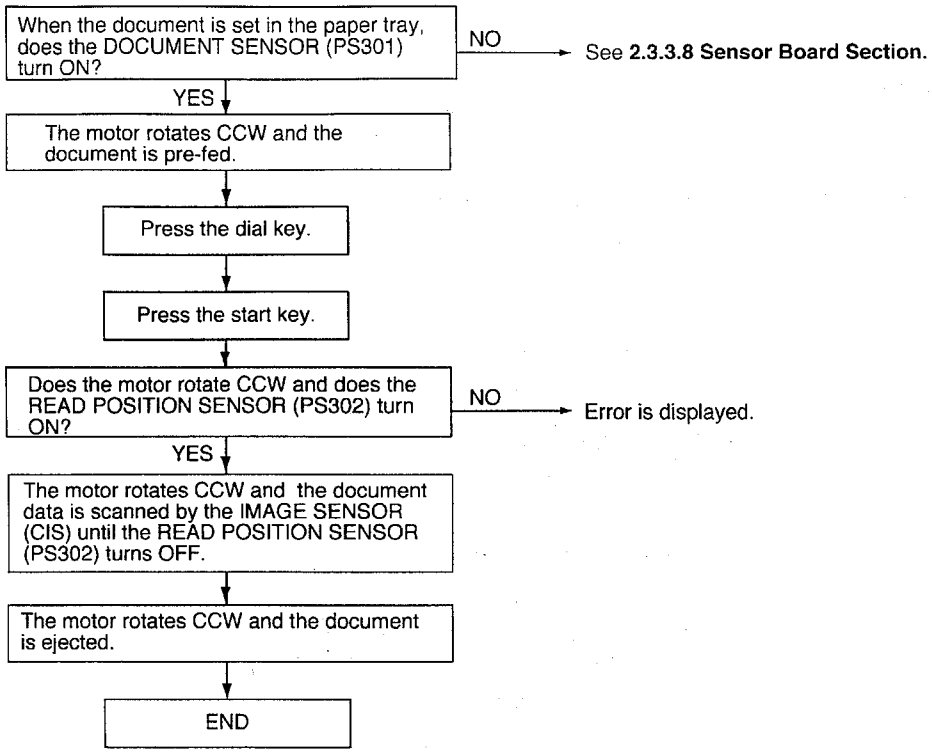
6.4.6.3. Mechanical movements in the main operations (transmitting documents, receiving faxes and copying)

6.4.6.3.1. Idle status

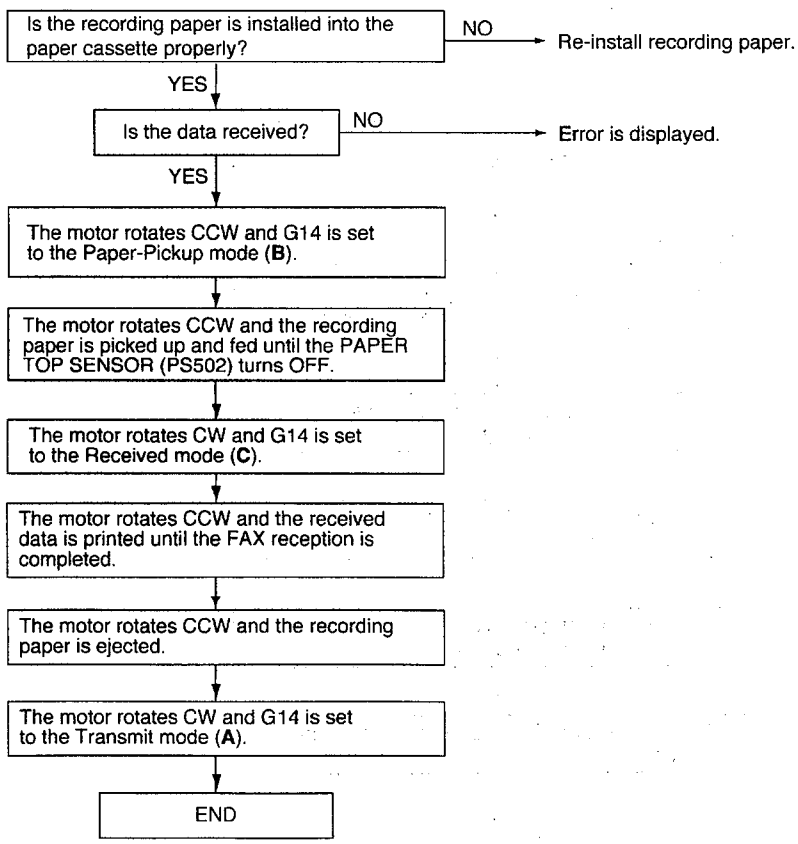

Power ON.
The motor rotates CW and G14 is set to the Receive mode (C).
The motor rotates CCW and drives the Platen Roller. (The ink film is wound.)
Does the INK FILM END SENSOR (PS501) turn ON?
NO
YES
The motor rotates CW and G14 is set to the Transmit mode (A).
"FILM EMPTY "is displayed.
See 2.3.3.8 Sensor Board Section.
The motor rotates CCW and the Separation Roller pre-feeds documents. (The machine is in the idle status.)
END

Note: See **"Sensor Locations"** in **6.5. SENSORS AND SWITCHES.**

6.4.6.3.2. Transmitting documents

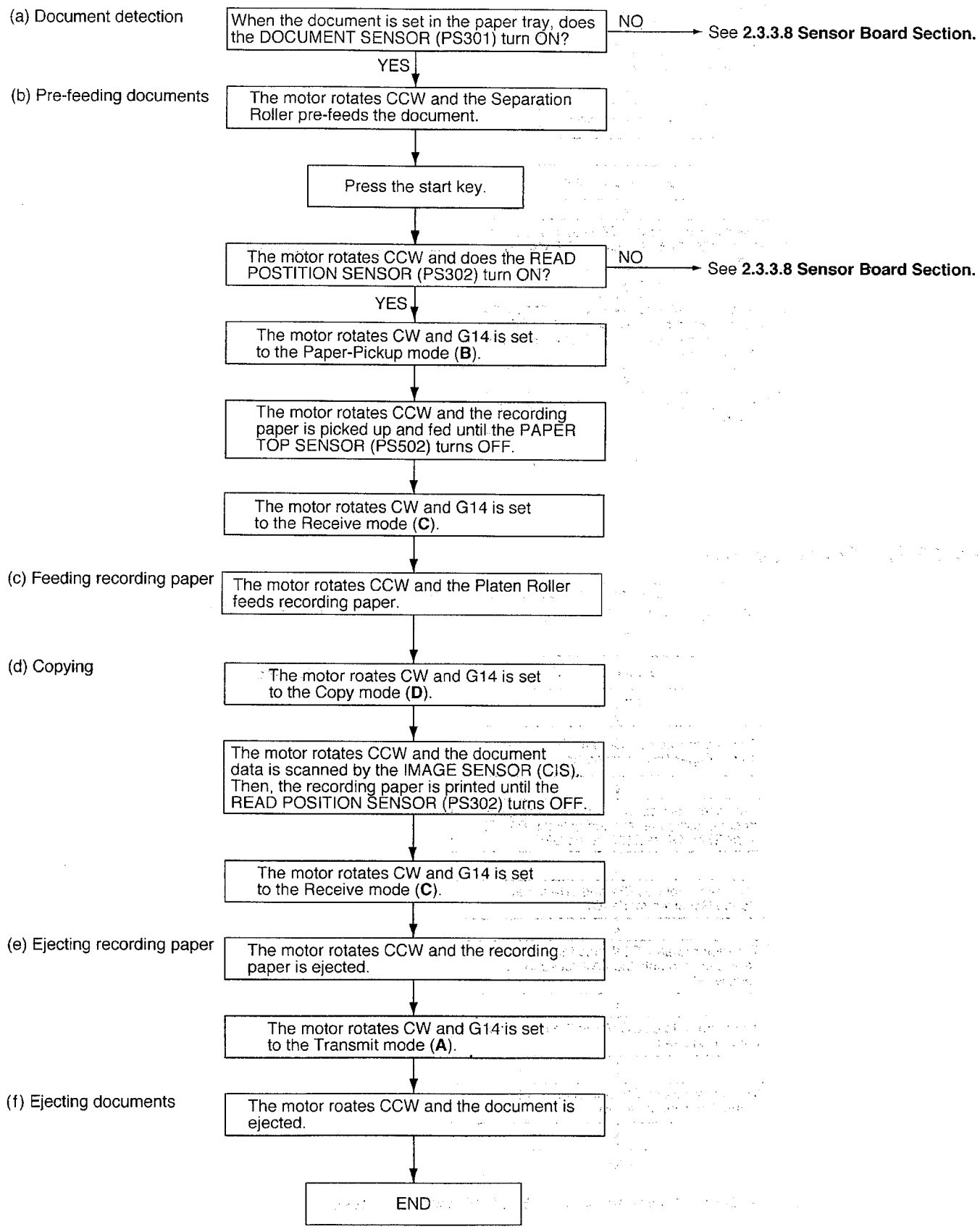

When the document is set in the paper tray, does the DOCUMENT SENSOR (PS301) turn ON?
NO
See 2.3.3.8 Sensor Board Section.
YES
The motor rotates CCW and the document is pre-fed.
Press the dial key.
Press the start key.
Does the motor rotate CCW and does the READ POSITION SENSOR (PS302) turn ON?
NO
Error is displayed.
YES
The motor rotates CCW and the document data is scanned by the IMAGE SENSOR (CIS) until the READ POSITION SENSOR (PS302) turns OFF.
The motor rotates CCW and the document is ejected.
END

6.4.6.3.3. Receiving FAX


Is the recording paper is installed into the paper cassette properly?
NO
Re-install recording paper.
YES
Is the data received?
NO
Error is displayed.
YES
The motor rotates CCW and G14 is set to the Paper-Pickup mode (B).
The motor rotates CCW and the recording paper is picked up and fed until the PAPER TOP SENSOR (PS502) turns OFF.
The motor rotates CW and G14 is set to the Received mode (C).
The motor rotates CCW and the received data is printed until the FAX reception is completed.
The motor rotates CCW and the recording paper is ejected.
The motor rotates CW and G14 is set to the Transmit mode (A).
END

Note: See **"Sensor Locations"** in **6.5. SENSORS AND SWITCHES.**

6.4.6.3.4. Copying


(a) Document detection
When the document is set in the paper tray, does the DOCUMENT SENSOR (PS301) turn ON?
NO
See 2.3.3.8 Sensor Board Section.
YES
(b) Pre-feeding documents
The motor rotates CCW and the Separation Roller pre-feeds the document.
Press the start key.
The motor rotates CCW and does the READ POSTITION SENSOR (PS302) turn ON?
NO
See 2.3.3.8 Sensor Board Section.
YES
The motor rotates CW and G14 is set to the Paper-Pickup mode (B).
The motor rotates CCW and the recording paper is picked up and fed until the PAPER TOP SENSOR (PS502) turns OFF.
The motor rotates CW and G14 is set to the Receive mode (C).
(c) Feeding recording paper
The motor rotates CCW and the Platen Roller feeds recording paper.
(d) Copying
The motor roates CW and G14 is set to the Copy mode (D).
The motor rotates CCW and the document data is scanned by the IMAGE SENSOR (CIS). Then, the recording paper is printed until the READ POSITION SENSOR (PS302) turns OFF.
The motor rotates CW and G14 is set to the Receive mode (C).
(e) Ejecting recording paper
The motor rotates CCW and the recording paper is ejected.
The motor rotates CW and G14 is set to the Transmit mode (A).
(f) Ejecting documents
The motor roates CCW and the document is ejected.
END

Note: See **"Sensor Locations"** in **6.5. SENSORS AND SWITCHES.**

6.5. SENSORS AND SWITCHES

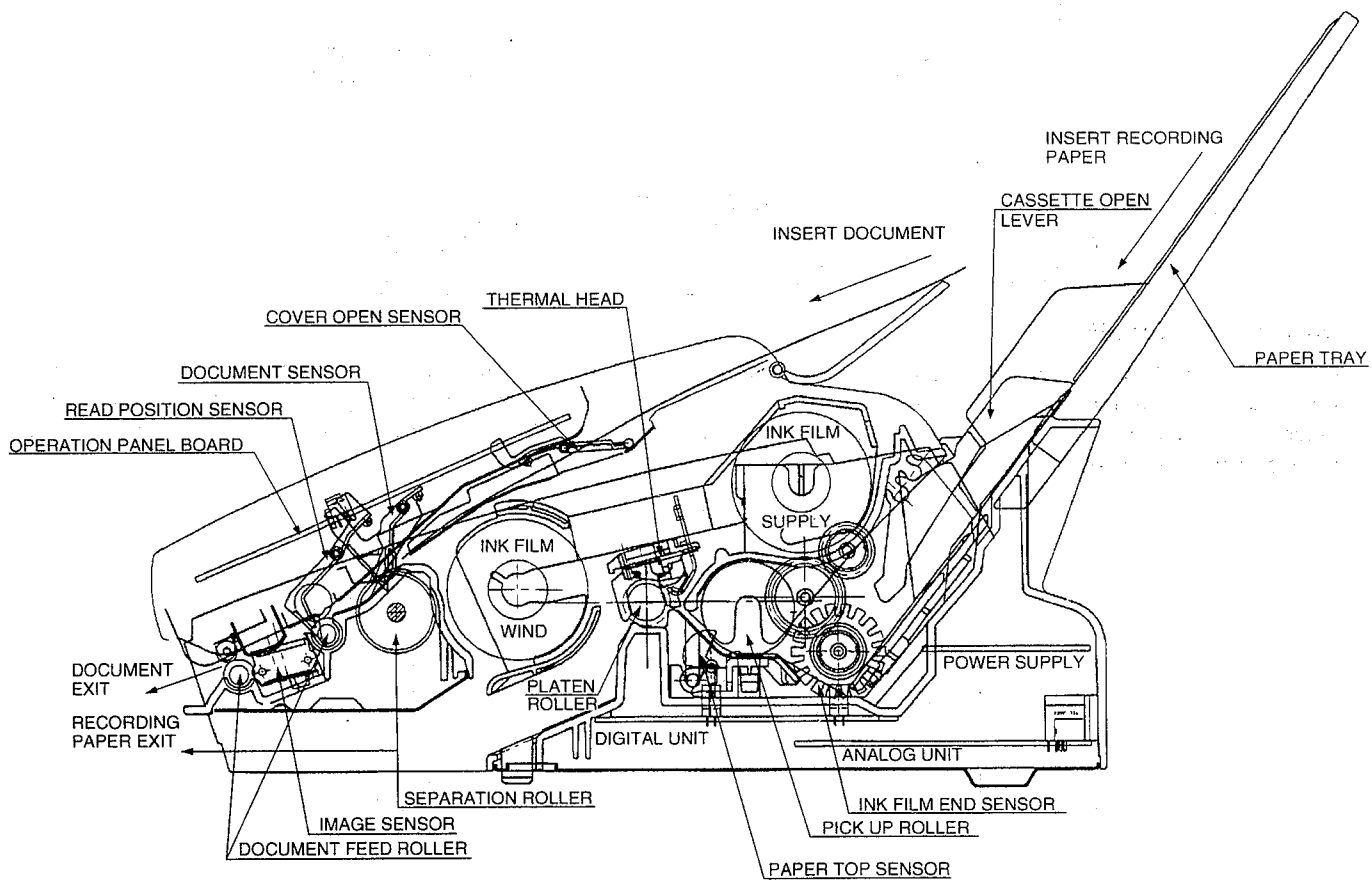
All of the sensor and switches are shown below.

Sensor Circuit Location	Sensor	Sensor or Switch Name	Message Error
Operation Panel	PS301	Document	[CHECK DOCUMENT]
	PS302	Document Read Position	[REMOVE DOCUMENT]
	PS303	Cover Open	[CHECK COVER]
Hook	SW401	Hook	———
Digital PCB	PS501	Film End	[FILM EMPTY]
	PS502	Paper Top	[PAPER JAMMED]
Motor Block	SW	Motor Position	———

Note:

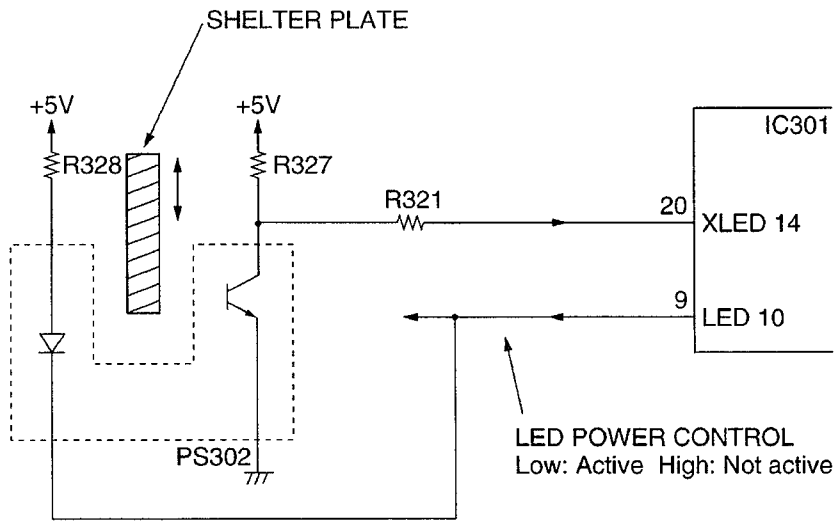
See **2.5. TEST FUNCTIONS**. (#815: Sensor Check)

Sensor Locations



1. **[Read Position Sensor (PS302)]**

When a document is brought to the read position, the shelter plate is lifted, the phototransistor becomes ON, and the input signal of IC301-20 pin (Operation) becomes a low level. When there is no document at the read position, the shelter plate closes the sensor light, the phototransistor becomes OFF, and the input signal of IC301-20 pin (Operation) becomes a high level. (When checking this sensor, the IC301-9 pin becomes a low level.)

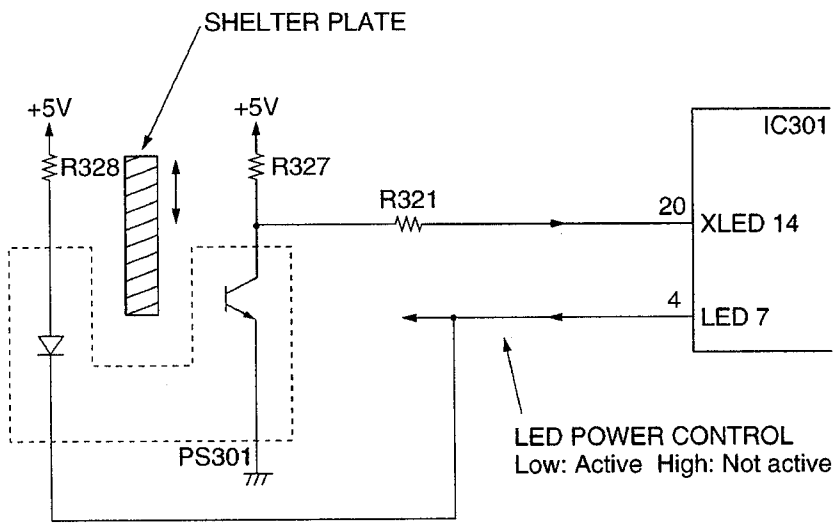


Operation Board

	Phototransistor	Signal (IC301-20 pin)
Out of the Read Position	OFF	High level
At the Read Position	ON	Low level

2. **[Document Sensor (PS301)]**

When a document is set, the shelter plate closes the sensor light, the phototransistor becomes OFF, and the input signal of IC301-20 pin (Operation) becomes a high level. When there is no document, the shelter plate is lifted, the phototransistor becomes ON, and the input signal of IC301-20 pin (Operation) becomes a low level. (When checking this sensor, the IC301-4 pin becomes a low level.)

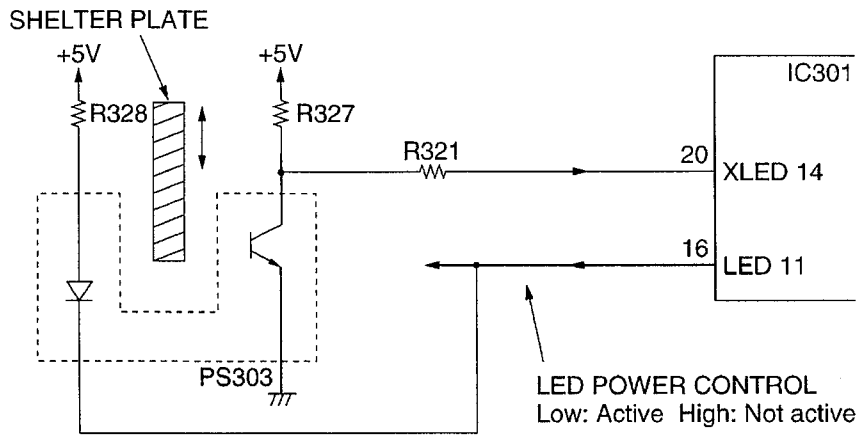


Operation Board

	Phototransistor	Signal (IC301-20 pin)
No document	ON	Low level
Set document	OFF	High level

3. **[Cover Open Sensor (PS303)]**

When the operation panel cover is closed, the shelter plate is lifted, the phototransistor becomes ON, and the input signal of IC301-20 pin (Operation) becomes a low level. When the cover is opened, the shelter plate shuts the sensor light, the phototransistor becomes OFF, and the input signal of IC301-20 pin (Operation) becomes a high level.



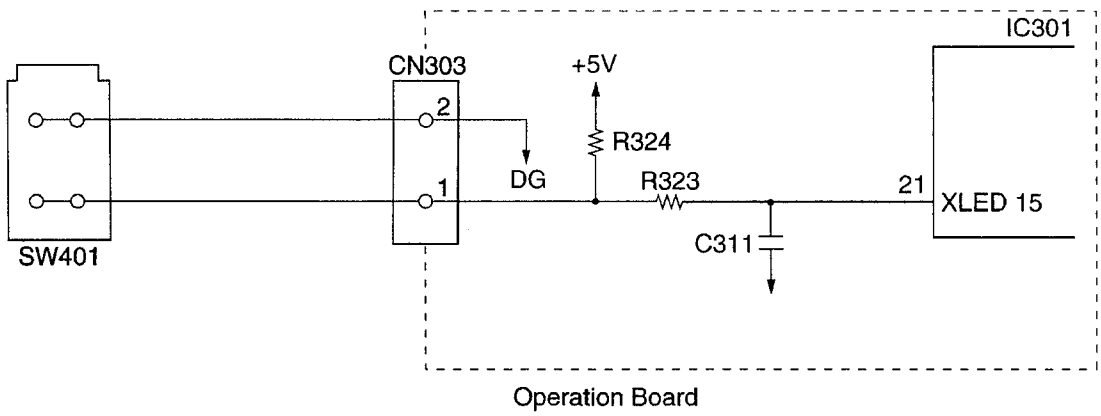
Operation Board

	Phototransistor	Signal (IC301-20 pin)
Open	OFF	High level
Closed	ON	Low level

4. **[Hook Switch (SW401)]**

When the handset is lifted, the switch turns ON, and the signal at pin 21 of IC301 becomes low.

When the handset is returned, the switch turns OFF, and the signal at pin 21 of IC301 becomes high.

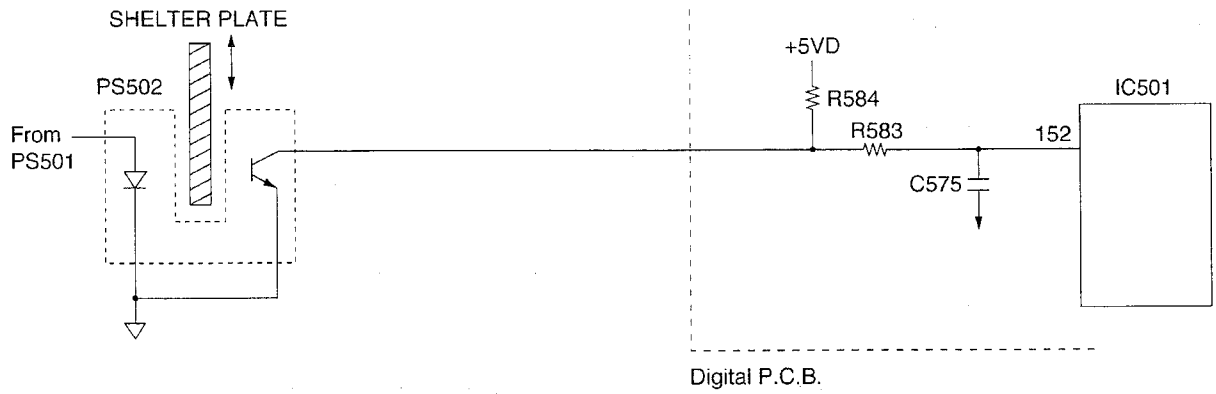


Operation Board

	SW	Signal (IC301-21 pin)
ON-Hook	OFF	High level
OFF-Hook	ON	Low level

5. **[Paper top Sensor (PS502)]**

When the recording paper is loaded on the print head, the shelter plate shuts the sensor light, and the phototransistor becomes OFF. The input signal of IC501-152 pin becomes a high level. Usually, the shelter plate is lifted, the phototransistor becomes ON, and the input signal of IC501-152 pin becomes a low level.

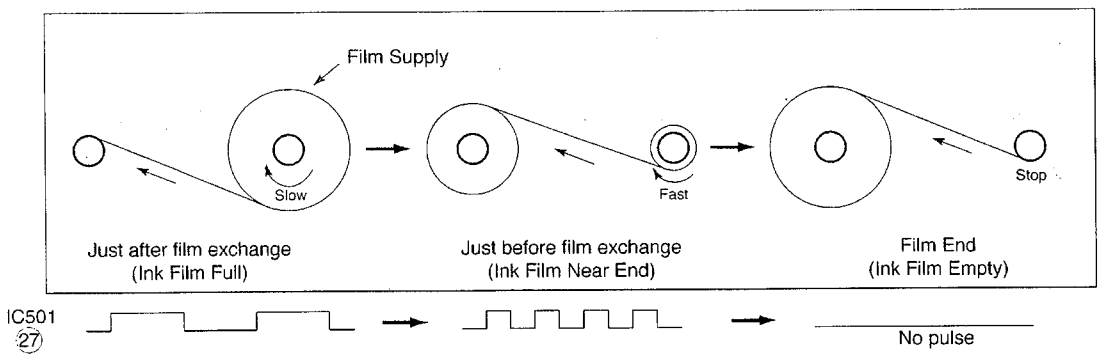


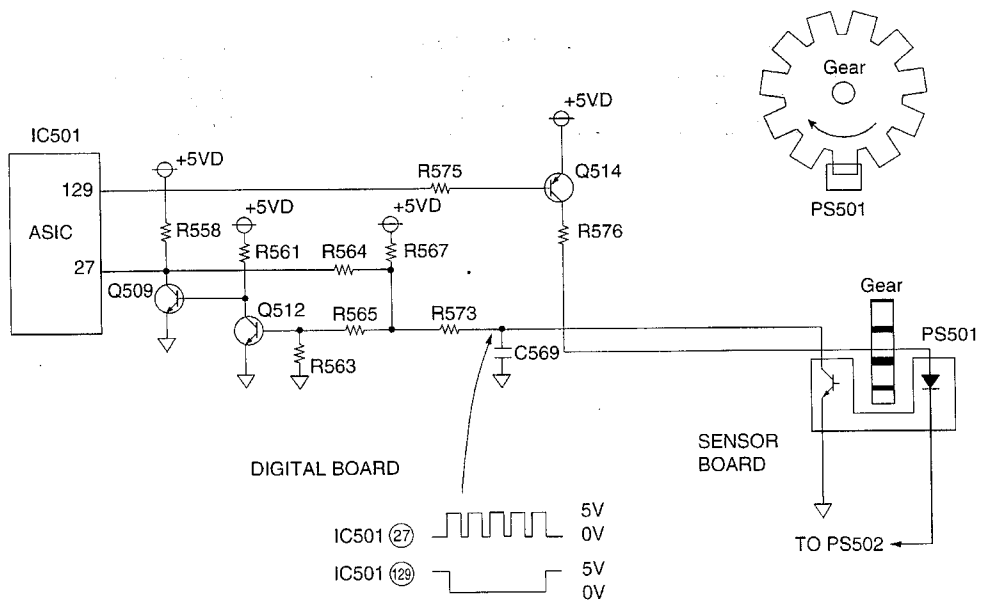
	Phototransistor	Signal (IC501-152 pin)
Set recording paper	OFF	High level
No recording paper	ON	Low level

6. **[Film End Sensor (PS501)]**

As the amount of the film decreases, the revolving speed of the rolled film becomes faster. When the film is used up, it comes off from the paper roll. The amount of the remaining film is measured by the revolving speed. When the film stops turning around, the sensor detects the film end.

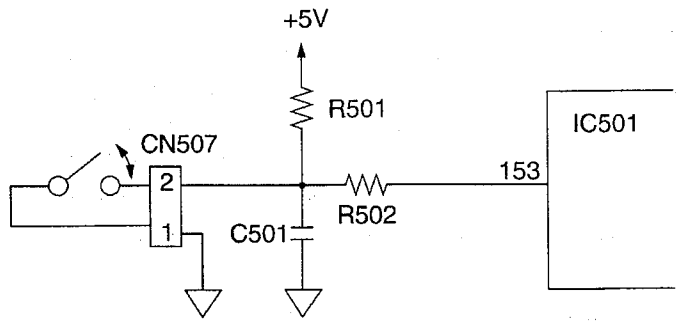
The rotary encoder rotates slowly when the ink film is full (when printing), as shown in the diagram below. It rotates faster when it is near its end. Sensor PS501 converts the rotation of the rotary encoder into pulses and the amount of the remaining ink film is then calculated internally by the ASIC (IC501) and stored into memory. Then an error message such as "FILM EMPTY" or "FILM NEAR EMPTY" appears on the LCD display.





7. [Motor Position Sensor (Switch)]

This sensor is a detection switch for recording the position of the CAM.



Digital Board

	Signal (IC501-153 pin)
Home position	Low level
Other	High level

6.6. MODEM SECTION

6.6.1. FUNCTION

The unit uses a 1 chip modem (IC505) that serves as an interface between the control section for FAX transmission and reception and the telephone line. During a transmitting operation, the digital image signals are modulated and sent to the telephone line.

During a receiving operation, the analog image signals which are received via the telephone line are demodulated and converted into digital image signals. The communication format and procedures for FAX communication are standardized by CCITT. This 1 chip modem (IC505) has hardware which sends and detects all of the necessary signals for FAX communication.

It can be controlled by writing commands from the CPU (IC501: inside ASIC) to the register in the modem (IC505).

This modem (IC505) also sends DTMF signals, generates a call tone (from the speaker), and detects a busy tone and dial tones.

Overview of Facsimile Communication Procedures (CCITT Recommendation):

1. **ON CCITT (International Telegraph and Telephone Consultative Committee)**

   The No. XIV Group of CCITT, one of the four permanent organizations of the International Telecommunications Union (ITU), investigates and make recommendations on international standards for facsimiles.

2. **Definition of Each Group**

   - Group I (G1)

     Official A-4 size documents without using formats which reduce the band width of a signal are sent over telephone lines. Determined in 1968.

     Transmission for about 6 minutes at a scanning line density of 3.85 lines/mm.

   - Group II (G2)

     Using reduction technology in the modulation/demodulation format, an A-4 size document is sent at an official scanning line density of 3.85 lines/mm for about 3 minutes.

     Methods to suppress redundancy are not used.

     Determined in 1976.

   - Group III (G3)

     Method of suppressing redundancy in the image signal prior to modulation is used. An A-4 size document is sent within about one minute.

     Determined in 1980.

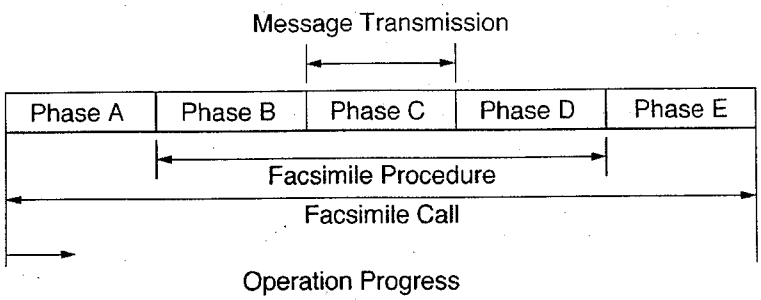
   - Group IV (G4)

     Transmission is via the data network. A method is provided for suppressing redundancy in signals prior to transmission, and error-free reception of transmission is possible.

     The scope of these facsimile applications is not limited simply to transmission of written statements. Through symbiotic linkages with other communication methods, it can be expected to expand to include integrated services.

3. Facsimile Call Time Series

As shown in the following diagram, the facsimile call time series is divided into five phases.



Phase A : Call setting

Call setting can be manual/automatic.

Phase B : Pre-message procedure

Phase B is a pre-processing procedure and sequence for confirming the status of the terminal, transmission route, etc., and for terminal control. It implements terminal preparation status, determines and displays terminal constants, confirms synchronization status, etc. and prepares for transmission of facsimile messages.

Phase C : Message transmission

Phase C is the procedure for the transmitting facsimile messages.

Phase D : Post message procedure

Phase D is the procedure for confirming that the message is completed and received. For continuous transmission, phase B or phase C is repeated for transmission.

Phase E : Call retrieval

Phase E is the procedure for call retrieval, that is for circuit disconnection.

4. Concerning Transmission Time

Transmission Time = Control Time + Image Transmission Time + Hold Time

Transmission time consists of the following.

Control time:

This is time at the start of transmission when the functions at the sending and receiving sides are confirmed, the transmission mode is established, and transmission and reception are synchronized.

Image transmission time:

This is the time required for the transmission of document contents (image data). In general, this time is recorded in the catalog, etc.

Hold time:

This is the time required after the document contents have been sent to confirm that the document was actually sent, and to check for telephone reservations and/or the existence of continuous transmission.

5. Facsimile Standards

Item	Telephone Network Facsimile G3 Machine
Connection Control Mode	Telephone Network Signal Mode
Terminal Control Mode	T. 30 Binary
Facsimile Signal Format	Digital
Modulation Mode	PSK (V. 27 ter) or QAM (V. 29)
Transmission Speed	300 bps (Control Signal) 2400, 4800, 7200, 9600, 12000, 14400 bps (FAX Signal)
Redundancy Compression Process (Coding Mode)	1 dimension : MH Mode 2 dimension : MR Mode (K=2.4)
Resolution	Main Scan : 8 pel/mm Sub Scan : 3.85, 7.7l/mm
Line Synchronization Signal	EOL Signal
1 Line Transmission Time [ms/line]	Depends on the degree of data reduction. Minimum Value : 10, 20 Can be recognized in 40ms.

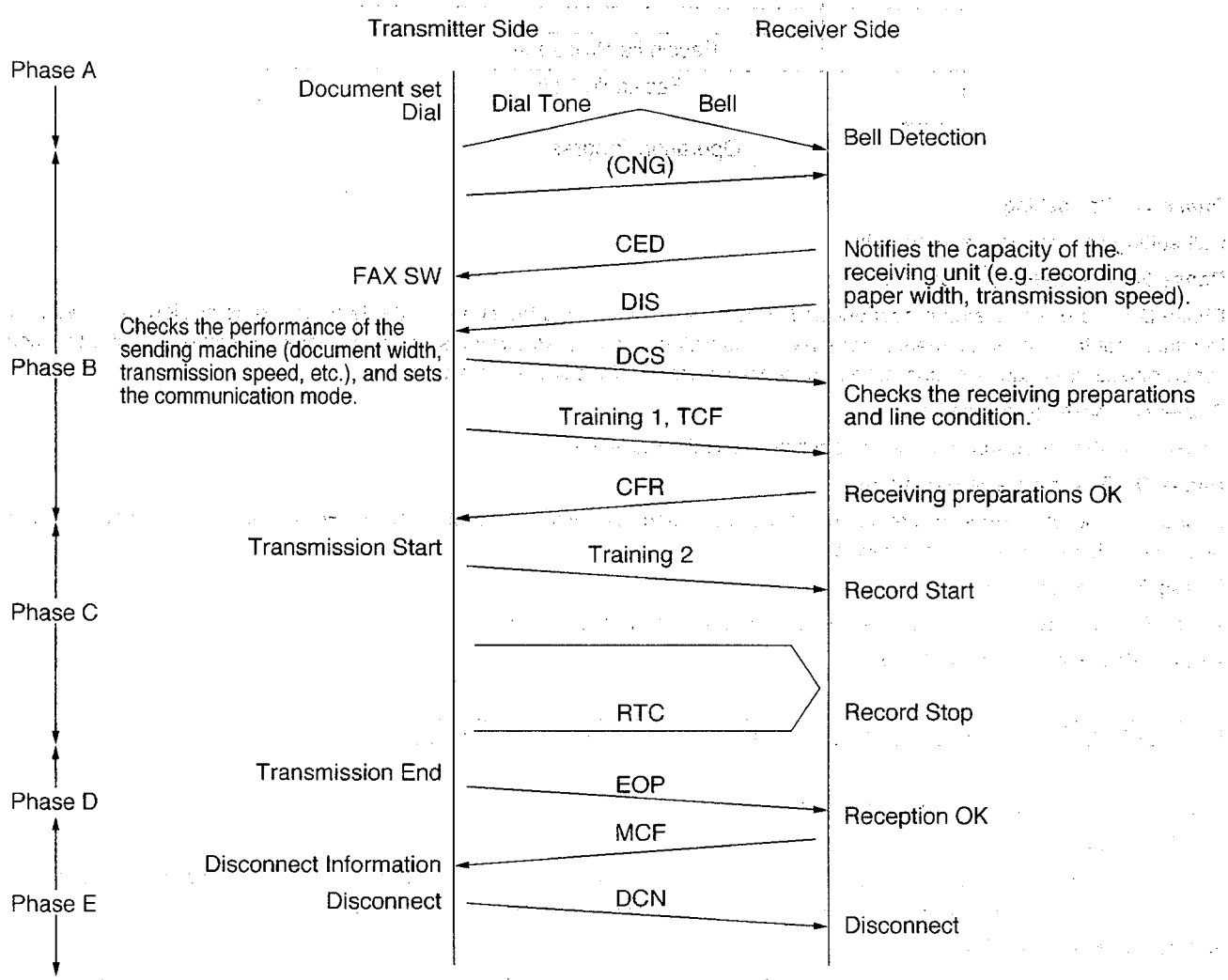
6. Explanation of Communication and Compression Technology

a. G3 Communication Signals (T. 30 Binary Process)

For G3 Facsimile communication, this is the procedure for exchanging control signals between the sending and receiving machines both before and after transmission of image signals.

Control signals at 300 bps FSK are: 1850 Hz...0, 1650Hz...1.

An example of a binary process in G3 communication is shown below.



Explanation of Signals

Control signals are comprised mainly of 8-bit identification signals and the data signals added to them. Data signals are added to DIS and DCS signals.

Signal.....DIS (Digital Identification Signal)
Identification Signal Format.....00000001

Function:

Notifies the capacity of the receiving unit. The added data signals are as follows.

Signal.....DCS (Digital Command Signal)
Identification Signal Format.....X1000001

Example (Some models do not support the following items.):

Bit No.	DIS/DTC	DCS
1	Transmitter --- T.2 operation	
2	Receiver --- T.2 operation	Receiver --- T.2 operation
3	T.2 IOC = 176	T.2 IOC = 176
4	Transmitter --- T.3 operation	
5	Receiver --- T.3 operation	Receiver --- T.3 operation
6	Reserved for future T.3 operation features	
7	Reserved for future T.3 operation features.	
8	Reserved for future T.3 operation features.	

Bit No.	DIS/DTC	DCS
9	Transmitter --- T.4 operation	
10	Receiver --- T.4 operation	Receiver --- T.4 operation
11, 12, 13, 14 0, 0, 0, 0 0, 1, 0, 0 1, 0, 0, 0 1, 1, 0, 0 0, 0, 1, 0 0, 1, 1, 0 1, 0, 1, 0 1, 1, 1, 0 0, 0, 0, 1 0, 1, 0, 1 1, 0, 0, 1 1, 1, 0, 1 0, 0, 1, 1 0, 1, 1, 1 1, 0, 1, 1 1, 1, 1, 1	Data signaling rate V.27 ter fall back mode V.27 ter V.29 V.27 ter and V.29 Not used Reserved Not used V.27 ter and V.29 and V.33 Not used Reserved Not used V.27 ter and V.29 and V.33 and V.17 Not used Reserved Not used Reserved	Data signaling rate 2400 bit/s, V.27 ter 4800 bit/s, V.27 ter 9600 bit/s, V.29 7200 bit/s, V.29 14400 bit/s, V.33 12000 bit/s, V.33 Reserved Reserved 14400 bit/s, V.17 12000 bit/s, V.17 9600 bit/s, V.17 7200 bit/s, V.17 Reserved Reserved Reserved Reserved
15	R8x7.7 lines/mm and/or 200x200 pels/25.4mm	R8x7.7 lines/mm and/or 200x200 pels/25.4mm
16	Two-dimensional coding capability	Two-dimensional coding capability
17, 18 (0, 0) (0, 1) (1, 0) (1, 1)	Recording width capabilities 1728 picture elements along scan line length of 215 mm ± 1% 1728 picture elements along scan line length of 215 mm ± 1% 2048 picture elements along scan line length of 255 mm ± 1% 2432 picture elements along scan line length of 303 mm ± 1% 1728 picture elements along scan line length of 215 mm ± 1% 2048 picture elements along scan line length of 255 mm ± 1% Invalid	Recording width 1728 picture elements along scan line length of 215 mm ± 1% 2432 picture elements along scan line length of 303 mm ± 1% 2048 picture elements along scan line length of 255 mm ± 1% Invalid
19, 20 (0, 0) (0, 1) (1, 0) (1, 1)	Maximum recording length capability A4 (297 mm) Unlimited A4 (297 mm) and B4 (364 mm) Invalid	Maximum recording length A4 (297 mm) Unlimited B4 (364 mm) Invalid
21, 22, 23 (0, 0, 0) (0, 0, 1) (0, 1, 0) (1, 0, 0) (0, 1, 1) (1, 1, 0) (1, 0, 1) (1, 1, 1)	Minimum scan line time capability of the receiver 20 ms at 3.85 l/mm: $T_{7.7} = T_{3.85}$ 40 ms at 3.85 l/mm: $T_{7.7} = T_{3.85}$ 10 ms at 3.85 l/mm: $T_{7.7} = T_{3.85}$ 5 ms at 3.85 l/mm: $T_{7.7} = T_{3.85}$ 10 ms at 3.85 l/mm: $T_{7.7} = 1/2\ T_{3.85}$ 20 ms at 3.85 l/mm: $T_{7.7} = 1/2\ T_{3.85}$ 40 ms at 3.85 l/mm: $T_{7.7} = 1/2\ T_{3.85}$ 0 ms at 3.85 l/mm: $T_{7.7} = T_{3.85}$	Minimum scan line time 20 ms 40 ms 10 ms 5 ms 0 ms
24	Extend field	Extend field
25	2400 bit/s handshaking	2400 bit/s handshaking
26	Uncompressed mode	Uncompressed mode
27	Error correction mode	Error correction mode
28	Set to "0".	Frame size 0 = 256 octets 1 = 64 octets
29	Error limiting mode	Error limiting mode
30	Reserved for G4 capability on PSTN	Reserved for G4 capability on PSTN
31	T.6 coding capability	T.6 coding enabled
32	Extend field	Extend field
33 (0) (1)	Validity of bits 17, 18 Bits 17, 18 are valid Bits 17, 18 are invalid	Recording width Recording width indicated by bits 17, 18 Recording width indicated by this field bit information
34	Recording width capability 1216 picture elements along scan line length of 151 ± mm 1%	Middle 1216 elements of 1728 picture elements
35	Recording width capability 864 picture elements along scan line length of 107 ± mm 1%	Middle 864 elements of 1728 picture elements
36	Recording width capability 1728 picture elements along scan line length of 151 ± mm 1%	Invalid
37	Recording width capability 1728 picture elements along scan line length of 107 ± mm 1%	Invalid
38	Reserved for future recording width capability.	
39	Reserved for future recording width capability.	
40	Extend field	Extend field
41	R8x15.4 lines/mm	R8x15.4 lines/mm

Bit No.	DIS/DTC	DCS
42	300x300 pels/25.4 mm	300x300 pels/25.4 mm
43	R16x15.4 lines/mm and/or 400x400 pels/25.4 mm	R16x15.4 lines/mm and/or 400x400 pels/25.4 mm
44	Inch based resolution preferred	Resolution type selection "0" : neritic based resolution "1" : inch based resolution
45	Metric based resolution preferred	Don't care
46	Minimum scan line time capability for higher resolutions "0" : $T_{15.4} = T_{7.7}$ "1" : $T_{15.4} = 1/2T_{7.7}$	Don't care
47	Selective Polling capability	Set to "0".
48	Extend field	Extend field

Note 1 - Standard facsimile units conforming to T.2 must have the following capability : Index of cooperation (IOC)=264.

Note 2 - Standard facsimile units conforming to T.3 must have the following capability : Index of cooperation (IOC)=264.

Note 1 - Standard facsimile units conforming to T.4 must have the following capability : Paper length=297 mm.

Signal	Identification Signal Format	Function
Training 1	————	A fixed pattern is transmitted to the receiving side at a speed (2400 to 9600 bps) designated by DCS, and the receiving side optimizes the automatic equalizer, etc., according to this signal.
TCF (Training Check)	————	Sends 0 continuously for 1.5 seconds at the same speed as the training signal.
CFR (Confirmation to Receive)	X0100001	Notifies the sending side that TCF has been properly received. If TCF is not properly received, FTT (Failure To Train) X0100010 is relayed to the sender. The sender then reduces the transmission speed by one stage and initiates training once again.
Training 2	————	Used for reconfirming the receiving side like training 1.
Image Signal	Refer to the next page.	————
RTC (Return to Control)	————	Sends 12 bits (0...01 x 6 times) to the receiver at the same speed as the image signal and notifies completion of transmission of the first sheet.
EOP (End of Procedure)	X1110100	End of one communication
MCF (Message Confirmation)	X0110001	End of 1 page reception
DCN (Disconnect)	X1011111	Phase E starts.
MPS (Multi-Page Signal)	X1110010	Completion of transmission of 1 page. If there are still more documents to be sent, they are output instead of EOP. After MCF reception, the sender transmits an image signal of the second sheet.
PRI-EOP (Procedural Interrupt-EOP)	X1111100	If there is an operator call from the sender, it is output after RTC.
PIP (Procedural Interrupt Positive)	X0110101	This is output when an operator call is received.

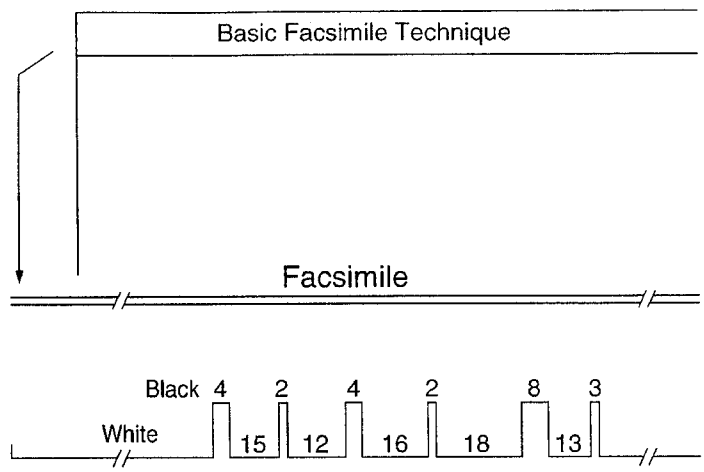
b. **Redundancy Compression Process Coding Mode**

This unit uses one-dimensional MH format.

(a) Document

(b) Part of document

(c) Run length and image signals equivalent to (b)



Modified Huffman (MH) Code		
Run length	Code for White Line	Code for Black Line
0	00110101	000011011
1	000111	010
2	0111	11
3	1000	10
4	1011	011
5	1100	0011
6	1110	0010
7	1111	00011
8	10011	000101
9	10100	000100
10	00111	0000100
11	01000	0000101
12	001000	0000111
13	000011	00000100
14	110100	00000111
15	110101	000011000
16	101010	0000010111
17	101011	0000011000
18	0100111	0000001000

(d) Codification of (c) according to MH formula

00110111101010 (White 400) 011 (Black 4) 110101 (White 15) 11 (Black 2) 001000 (White 12) 011 (Black 4) 101010 (White 16)

11 (Black 2) 0100111 (White 18) 000101 (Black 8) 000011 (White 13) 10 (Black 3)

(c) Total bit number before MH codification (497 bit)

(d) Total bit number after MH codification (63 bit)

6.6.2. MODEM CIRCUIT OPERATION

The modem (IC505) has all the hardware satisfying the ITU-T standards mentioned previously.

When the ASIC IC501 (77) is brought to a low level, the modem (IC505) is chip-selected and the resistors inside IC are selected by the select signals from ASIC (IC501) ADR0-ADR4. The commands are written through the data bus, and all the processing is controlled by the ASIC (IC501) according to ITU-T procedures. The $\overline{INT}$ signal dispatched from $\overline{IRQ1}$, 2 (pins 108 and 121 of IC505) to ASIC (IC501) when the transmission data is accepted and the received data is demodulated, the ASIC (IC501) implements post processing. This modem (IC505) has an automatic application equalizer.

With training signal 1 or 2 during G3 reception, it can automatically establish the optimum equalizer. The modem (IC505) operates using the 32.256 MHz clock (X503).

1. **Facsimile Transmission**

   The digital image data on the data bus is modulated in the modem (IC505), and sent from pin 69 via amplifier IC101 and the NCU section to the telephone line.

   Refer to **2.3.3.5. Analog Board Section**.

2. **Facsimile Reception**

   The analog image data which is received from the telephone line passes through the NCU section and enters pin 60 of the modem (IC505). The signals that enter pin 60 of the modem (IC505) are demodulated in the board to digital image signals, then placed on the data bus.

   In this case, the image signals from the telephone line are transmitted serially. Hence, they are placed on the bus in 8 bit units. Here, the internal equalizer circuit reduces the image signals to a long-distance receiving level.

   This is designed to correct the characteristics of the frequency band centered about 3 kHz and maintain a constant receiving sensitivity. It can be set in the service mode.

   Refer to **2.3.3.5. Analog Board Section**.

3. **DTMF Transmission (Monitor tone)**

   The DTMF signal generated in the modem (IC505) is output from pin 69, and is then sent to the circuit on the same route as used for facsimile transmission.

   Refer to **2.3.3.5. Analog Board Section**.

   (DTMF Monitor Tone)

   Refer to **2.3.3.5. Analog Board Section**.

4. **Call Tone Transmission**

   This is the call signal which is generated in the ASIC (IC501) and sent to the speaker.

   Refer to **2.3.3.5. Analog Board Section**.

5. **Busy/Dial Tone Detection**

   The path is the same as FAX receiving. When it is detected, the carrier detect bit of the resistor in the modem (IC505) becomes 1, and this status is monitored by the ASIC (IC501).

6.7. DESCRIPTION OF BLOCK DIAGRAM IN ANALOG SECTION

1. **Function**

The analog section works as an interface between the telephone line.

The multiplexer (composed of IC524 and IC525) on the digital board exchanges FAX TX and RX signals between the MODEM (IC505) and the analog section.
The control signals transmitted to the analog section are output mainly from ASIC IC501, and the analog status is stored as data in ASIC IC501.

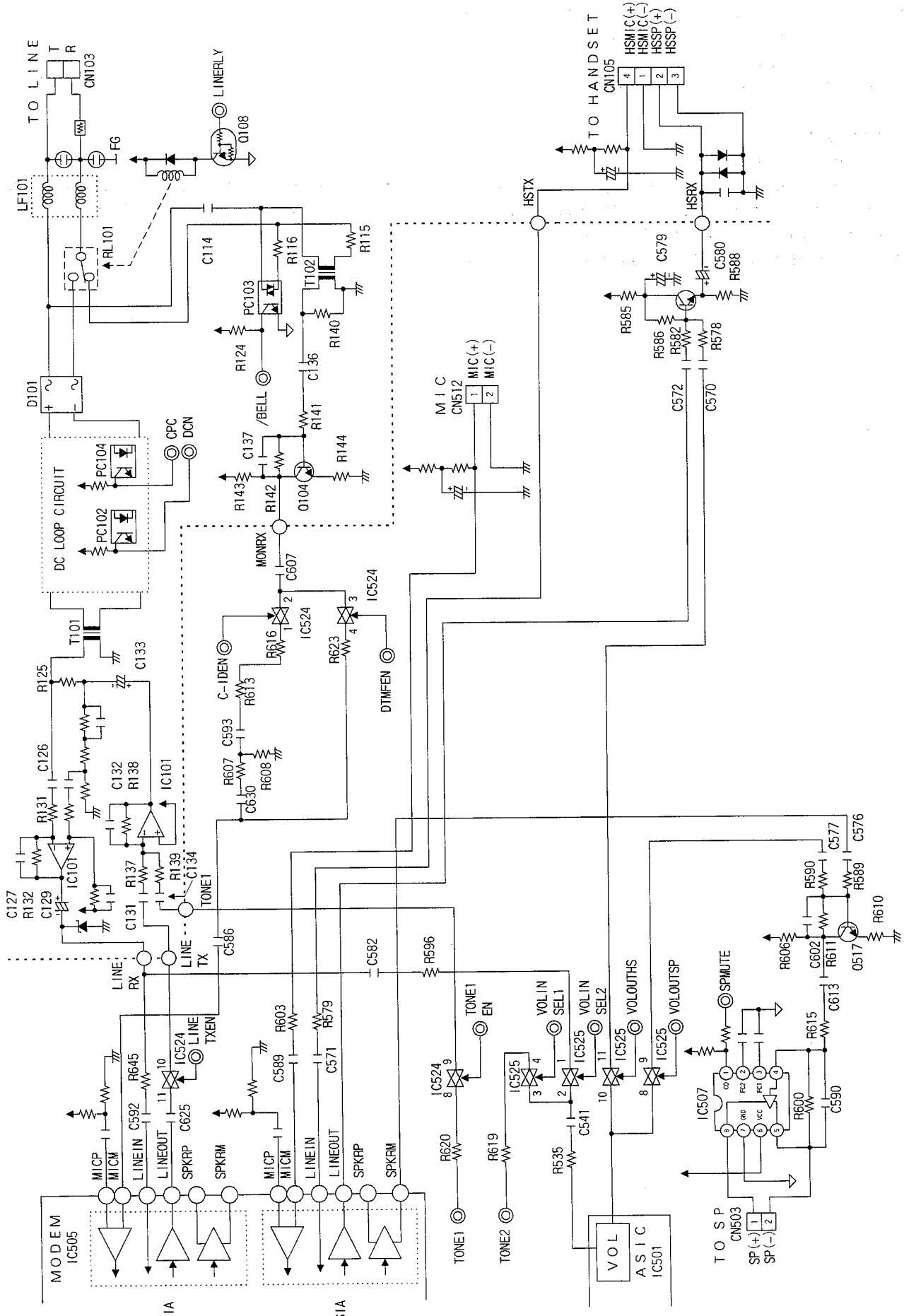
2. **Circuit Operation**

[NCU]:Network Control Unit

The NCU comprises of the following; DC loop forming circuit to connect with the telephone line; Switching circuit for other interconnected telephones; Bell detection circuit; Pulse dial generation circuit; Extension phone line off-hook detection circuit; Sidetone circuit; Remote fax activation circuit.

Refer to **6.8. NCU SECTION** for the details.

6.7.1. ANALOG UNIT BLOCK DIAGRAM



6.8. NCU SECTION

6.8.1. GENERAL

NCU is the interface with the telephone line. It is composed of Renmote FAX activation circuit, Bell detection circuit, Pulse dial circuit, CPC detection circuit, Line amplifier and sidetone circuits and Multiplexer. The following is a brief explanation of each circuit.

6.8.2. REMOTE FAX ACTIVATION CIRCUIT

1. **Circuit Operation**

After detecting the bell signal, another telephone connected to the same line switches to the FAX mode by DTMF signal.

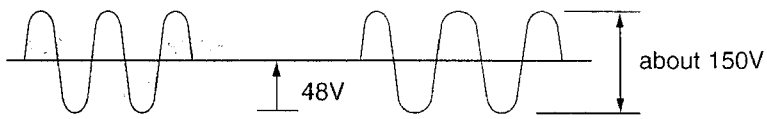
TEL LINE → T102 → C136 → R141 → Q104 (B-C) → CN102 (9) → {CN502(9) → C607 → IC524 (3-4) → R623 → C586 → IC505 (62)}

6.8.3. BELL DETECTION CIRCUIT

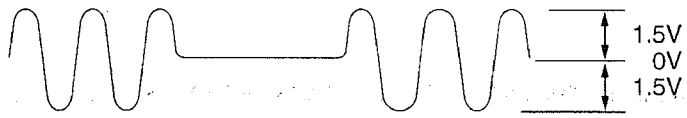
1. **Circuit Operation**

The signal waveform for each section is indicated below. The signal (low level section) input to pin 148 of ASIC IC501 on the digital board is illustrated.

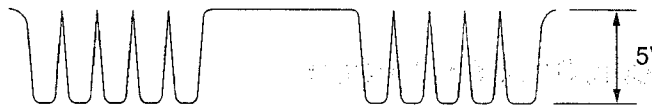
Between the Tip and Ring



Between PC103 (1) and (2)



PC103 (4)/ASIC IC501 (148)



TEL LINE → PC103 (1, 2 → 4) → IC501 (148): Bell

6.8.4. PULSE DIAL CIRCUIT AND ON/OFF HOOK CIRCUIT

While OFF-HOOK, RL101 is ON. Q108 turns on by pin (24) of IC501 as well. On the other hand, while ON-HOOK, Q108 turns OFF by pin (24) of IC501, then the line turns OFF. ON/OFF-HOOK, controlled by pin (24) of IC501, makes the pulse dial operation possible.

IC501 (24) LINE RLY Low Level → CN501 (6) → CN101 (6) → Q108 OFF → RL101 OFF : DC Loop OFF

IC501 (24) LINE RLY High Level → CN501 (6) → CN101 (6) → Q108 ON → RL101 ON : DC Loop ON

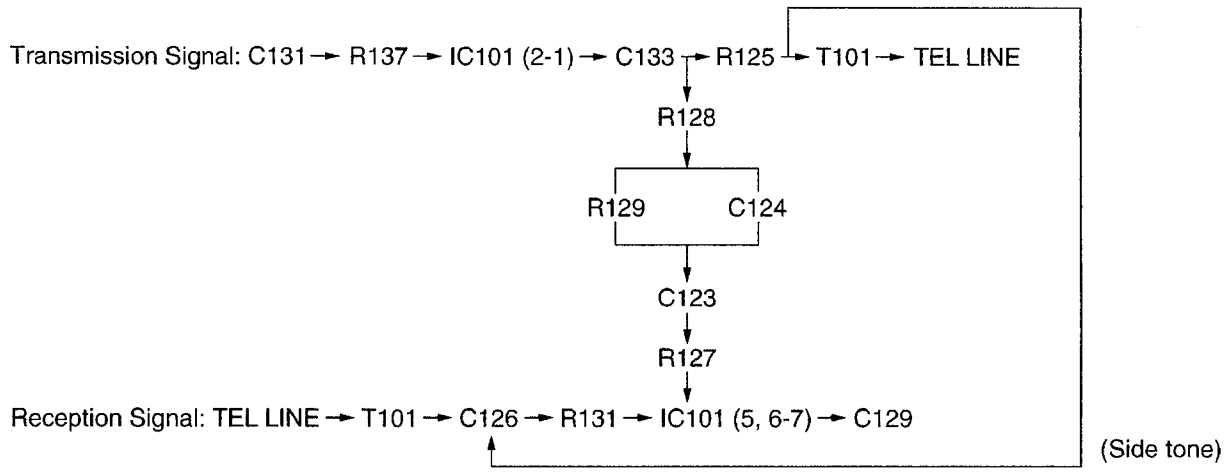
6.8.5. LINE AMPLIFIER AND SIDE TONE CIRCUITS

1. **Circuit Operation**

The reception signal output from the line transformer T101 is input to pin (6) of IC101 via C126 and R131, and then the signal is amplified at pin (7) of IC101 and sent to the reception system at 5dB.

The transmission signal goes through C131 and R137 and enters IC101-pin (2), where the signal is amplified to about 25dB. Then, it is output from pin (1) of IC101 and transmitted to T101 via C133 and R125. If the side tone circuit is not applied, the transmission signal will return to the reception amplifier via C126 and R131. When the side tone circuit is active, the signal output from IC101 pin (1) passes through C133, R128, R129, C124, C123 and R127 and goes into the amplifier IC101 pin (5). This circuit is used to cancel the transmission return signal.

Side Tone Circuit


Transmission Signal: C131 → R137 → IC101 (2-1) → C133 → R125 → T101 → TEL LINE
R128
R129
C124
C123
R127
Reception Signal: TEL LINE → T101 → C126 → R131 → IC101 (5, 6-7) → C129
(Side tone)

6.8.6. AUTO DISCONNECT CIRCUIT

1. **Function**

This circuit is used to detect that the telephone connected in parallel to the same line is OFF-HOOK while the unit picks up the line.

2. **Circuit Operation**

If the line is picked up, C104 is charged by the following path shown below.

Tip (Ring) → D101 → R103 → D102 → R105 → Q102 → PC102

If a telephone connected in parallel goes into OFF-HOOK status, the base of Q102 becomes low and PC102 turns OFF.

When the line is connected, Q102 and PC102 turn on, then pin (153) of IC501 (ASIC) on the digital board becomes low. On the other hand, When the line is disconnected, Q102 and PC102 turn off, then the pin (153) of IC501 (ASIC) becomes high.

6.8.7. CPC (Calling Party Control) DETECTION CIRCUIT

1. **Function**

This circuit detects the signal (cuts the current) output from the converter when the other party finishes ICM recording and goes into the ON-HOOK status.

TAD detects this signal and disconnects the line. When the TAD is operating, pin (4) of PC104 becomes a low level.

While detecting the CPC signal, pin (4) of PC104 becomes a high level. When the CPC signal is detected, the TAD operation stops and the line is disconnected.

6.8.8. CALLING LINE IDENTIFICATION CIRCUIT

1. **Function**

This unit is compatible with the Caller ID service offered by your local telephone company. To use this feature, you must subscribe to a Caller ID service. The data for the caller ID from the telephone exchange is sent during the interval between the first and second rings of the bell signal. The data from the telephone exchange is a modem signal which is modulated in an FSK (Frequency Shift Keying) format. Data "0" is a 1200 Hz sine wave, and data 1 a 2200 Hz sine wave.

There are two type of the message format which can be received:i.e.the single data message format and multiple data message format.

The multiple data format allows to transmit the name and data code information in addition to the time and telephone number data.

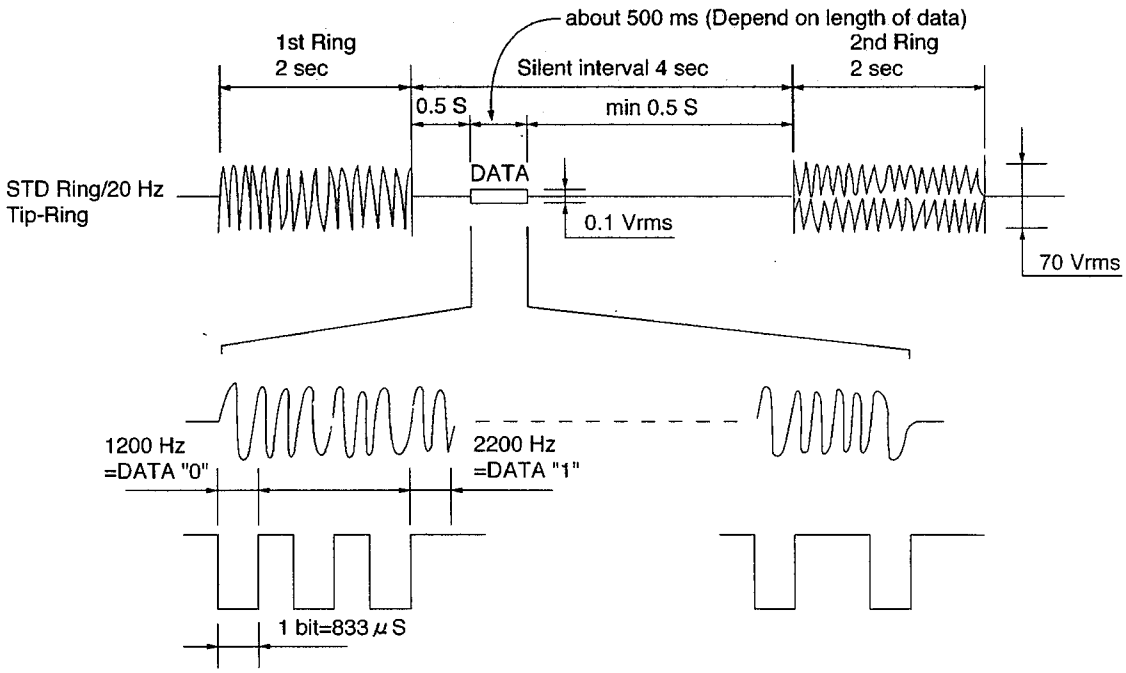
When there is multiple data in the unit, the name or telephone number are displayed.

2. **Circuit Operation:**

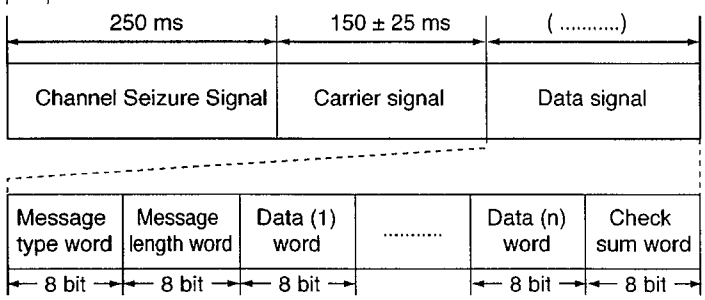
The caller ID signal input from TEL LINE is processed with MODEM (IC505).

Refer to **2.3.3.5. Analog Board Section** for the route of caller ID signal.

Timing Chart

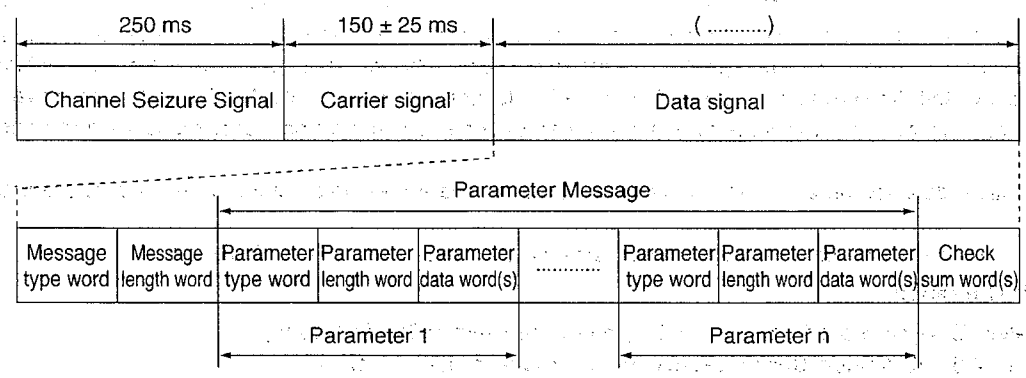


• **Single data message**



•1 word = All 8 bit data
•Message Type Word = Fixed value "00000100"
•Message Length Word = number of the data word
•Data word = The data value (month, day, hour, minute, telephone number)

• **Multiple data message**



- 1 word = All 8 bit data
- Message Type = Fixed value "10000000"
- Message Length Word = number of the Parameter Message word
- Parameter Type Word = Kind of data (ex. the time, phone number)
- Parameter Length Word = number of the Parameter data word
- Parameter Word (s) = the data value

6.9. ITS (Integrated telephone System) and MONITOR SECTION

6.9.1. GENERAL

The general ITS operation is performed by the special IC505 which has a handset circuit. The alarm tone, the key tone, and the beep are output from the ASIC IC501 (digital board). During the pulse dial operation, the monitor tone is output from the ASIC IC501.

6.9.2. SPEAKER PHONE CIRCUIT

1. **Function**

   The circuit controls the automatic switching of the transmitted and received signals, to and from the telephone line, when the unit is used in the hands-free mode.

2. **Circuit Operation**

   The speakerphone can only provide duplex.

3. **Signal path**

   Refer to **2.3.3.5. Analog Board Section**.

6.9.3. HANDSET CIRCUIT

1. **Function**

   This circuit controls the conversation over the handset, i.e. the transmitted and received voices to and from the handset.

2. **Signal path**

   Refer to **2.3.3.5. Analog Board Section**.

6.9.4. MONITOR CIRCUIT FOR EACH SIGNALS

1. **Function**

   This circuit monitors various tones, such as ① DTMF tone, ② Alarm/Beep/Key tone/Bell ③ Dummy ring back tone.

2. **Signal path**

   Refer to **2.3.3.5. Analog Board Section**.

6.10. ATAS (Automatic Telephone Answering System) SECTION

1. **Function**

   The ATAS main operation is performed by the special IC505 (MODEM). IC510 (FLASH MEMORY)'s control signals are input from ASIC IC501.

   a. Greeting/Message Recording

   b. ICM Recording

   c. Greeting/Message/ICM play to speaker

   d. Greeting/Message/ICM play to Tel Line

   e. Vox Detection

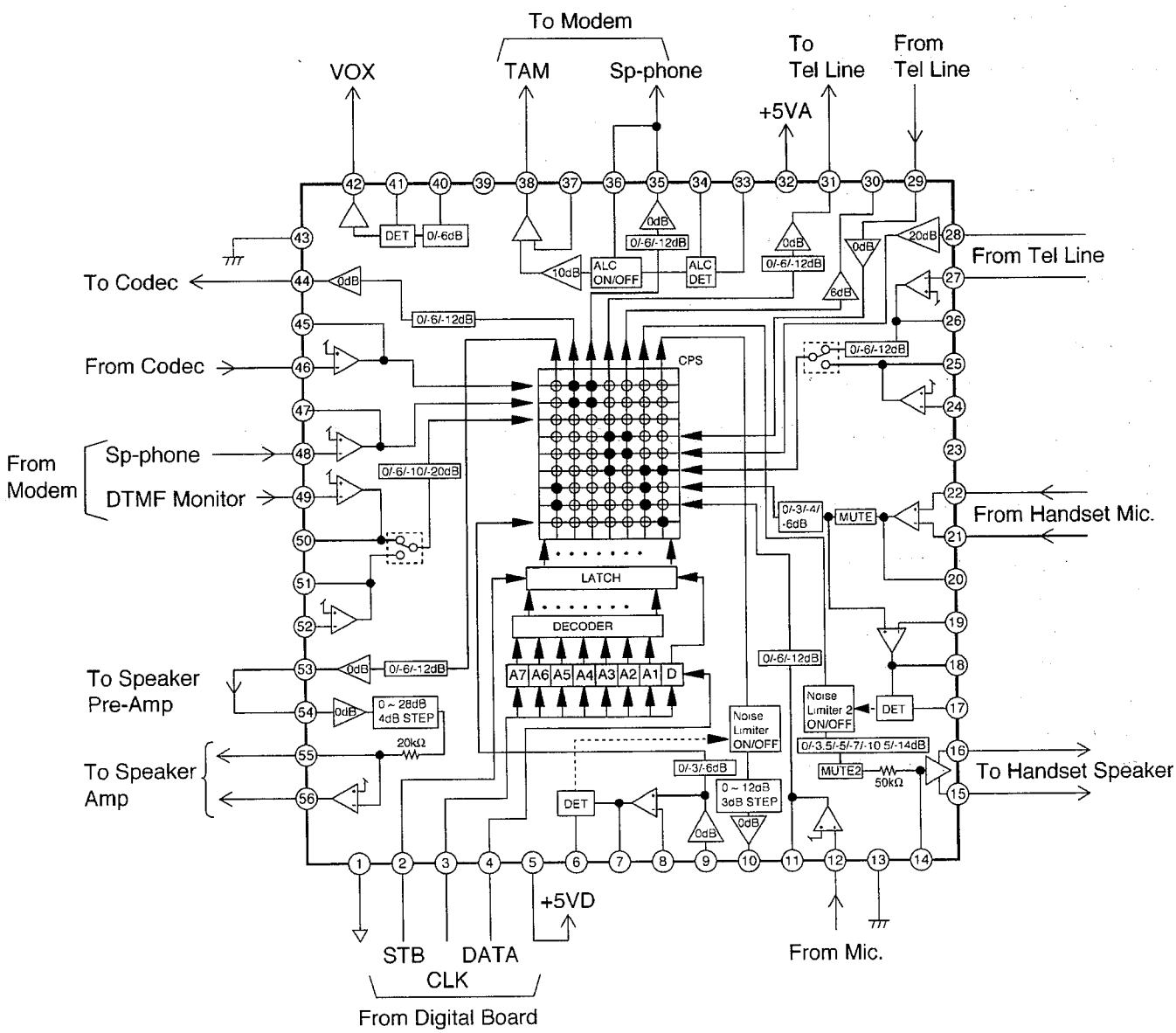
2. **Signal Path**

   Refer to **2.3.3.5. Analog Board Section**.

6.11. ANALOG GATE ARRAY (IC103 on the Analog Board)

This IC can perform signal route switching and level adjustments for various types of analog signals. This IC incorporates a cross-point switch (CPS), an electronic volume, an auto level controller (ALC) circuit for recording and an attenuation circuit. The C.P.S. of this IC is controlled by sending data from digital board.

6.11.1. Internal Connections



6.11.2. EXPLANATION OF ANALOG GATE ARRAY (IC103 on the Analog Board)

No.	Name	Function	No.	Name	Function
1	D-GND	Digital ground	29	LINEIN	Line amp input
2	STR	Strobe input	30	DHOUT	Not used
3	CLOCK	Clock input	31	LINEOUT	Line amp output
4	DATA	Data input	32	VCC	Analog power supply
5	VDD	Logic power supply	33	ALCIN	ALC input
6	NL1DET	Not used	34	ALCDET	ALC output
7	NL1OUT	Not used	35	PROUT2	Preamp output2
8	NL1IN	Not used	36	RECIN	Record input
9	CLIN	Not used	37	RECPRIN	Record preamp input
10	CLOUT	Not used	38	RECPROUT	Record preamp output
11	MICOUT	Mic amp output	39	VREF2	Internal reference voltage output
12	MICIN	Mic amp input	40	VOXIN	VOX input
13	GND	Analog ground	41	VOXDET	VOX detection adjustment
14	RIN	HS receiver amp input	42	VOXOUT	VOX output
15	ROUT1	HS receiver amp output1	43	GND2	Analog ground
16	ROUT2	HS receiver amp output2	44	LSRXOUT	SP phone TX amp output from mic
17	NL2DET	HS TX detection adjustment	45	LSTXOUT	SP phone RX amp output from codec
18	NL2OUT	HS TX detection amp input	46	LSTXIN	SP phone RX amp inverting input from codec
19	NL2IN	HS TX detection amp output	47	PLYOUT	SP phone TX amp output from modem
20	HSMICOUT	HS mic amp output	48	PLYIN	SP phone TX amp inverting input from modem
21	MSMIC-	HS mic amp -input	49	TONE1IN	Tone 1 amp inout
22	HSMIC+	HS mic amp +input	50	TONE1OUT	Tone 1 amp output
23	VREF1	Analog internal reference voltage	51	TONE2OUT	Tone 2 amp output
24	CIDIN	Caller ID amp input	52	TONE2IN	Tone 2 amp input
25	CIDOUT	Caller ID amp output	53	PROUT1	Preamp output1
26	EXTOUT	EXT amp output	54	SPPRIN	Speaker preamp input
27	EXTIN	EXT amp input	55	SPIN	Speaker amp input
28	DHIN	Monitor input	56	SPOUT	Speaker amp output

6.12. OPERATION BOARD SECTION

The unit consists of a LCD (Liquid crystal display), KEYs and LEDs (light-emitting diodes). They are controlled by the Gate Array (IC301) and ASIC (IC501: on the DIGITAL BOARD). (Fig.-a)
The key matrix table is shown below.

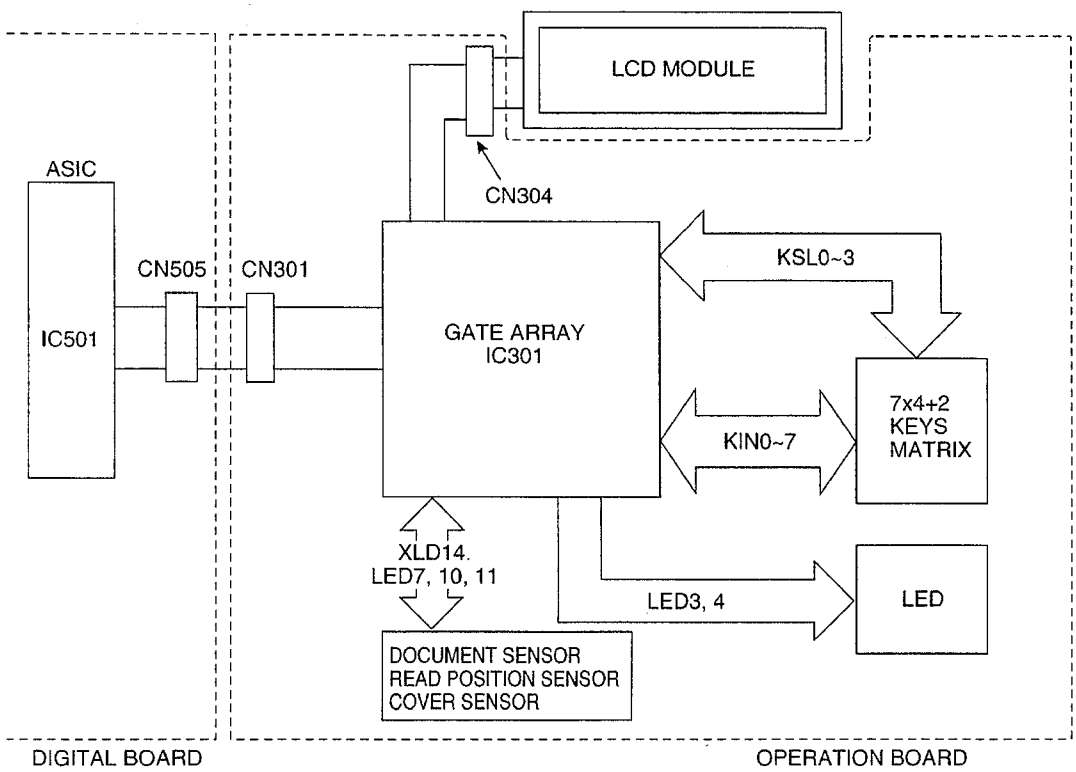


Fig-a

Key Matrix

	KIN0	KIN1	KIN2	KIN3	KIN4	KIN5	KIN6	KIN7
KSL0	SW301 *	SW305 START/SET/COPY	SW309 REDIAL/PAUSE	SW313 MUTE	SW317 9	SW321 PROGRAM	SW325 ONE 3, 6	SW329 IQ FAX
KSL1	SW303 VOL DOWN	SW306 STOP	SW310 6	SW314 3	SW318 8	SW322 MENU	SW326 LOWER	
KSL2	SW303 VOL UP	SW307 SP-PHONE	SW311 5	SW315 2	SW319 0	SW323 RESOLUTION	SW327 ONE 2, 5	SW331 CALLER ID
KSL3	SW304 HELP	SW308 #	SW312 4	SW316 1	SW320 7	SW324 QUICK SCAN	SW328 ONE 1, 4	SW332 AUTO ANSWER

	LED5	LED6
XLD12		SW335 PLAY MESSAGES
XLD13	SW334 RECORD	SW333 ERASE

← Ref. No of Operation Board

SENSOR

	LED7	LED10	LED11
XLD14	PS301 DOCUMENT SET	PS302 DOCUMENT TOP	PS303 COVER OPEN=1

LED

	LED2	LED3	LED4	LED8
	LED302 PLAY MESSAGES	LED303 TAD/FAX	LED301 SP-PHONE	LCD CONTRAST D: Darker = 0 N: Normal = 1

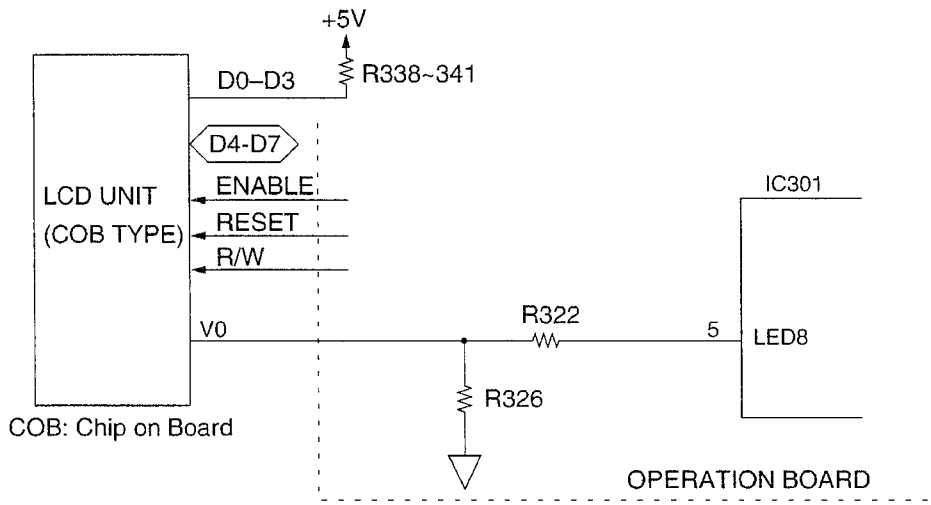
6.13. LCD SECTION

The Gate Array (IC301) works only for writing the ASCII code from the data bus (D4~D7). V0 is supplied for the crystal drive.

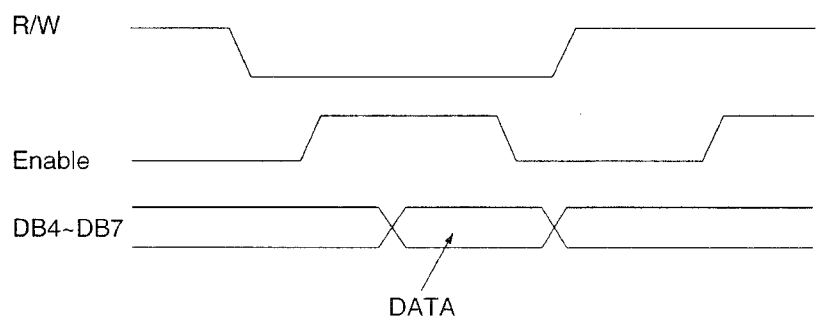
R326 and R322 are density control resistors.

Consequently, in this unit, the timing (positive clock) is generated by the LCD interface circuitry in the gate array (IC301).

Circuit Diagram



Timing Chart

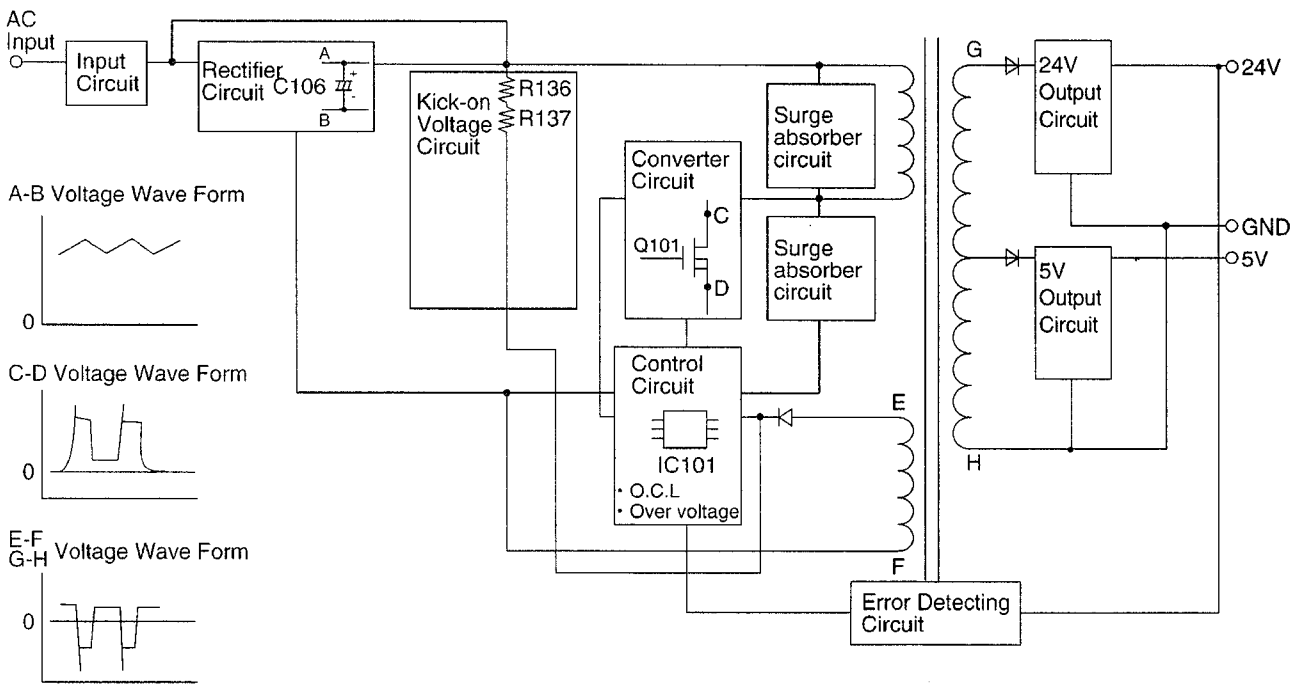


Density	Normal	Dark
LED8 (IC301-5pin)	H	L

6.14. POWER SUPPLY BOARD SECTION

This power supply board uses the switching regulator method.

Block Diagram



[Input Circuit]

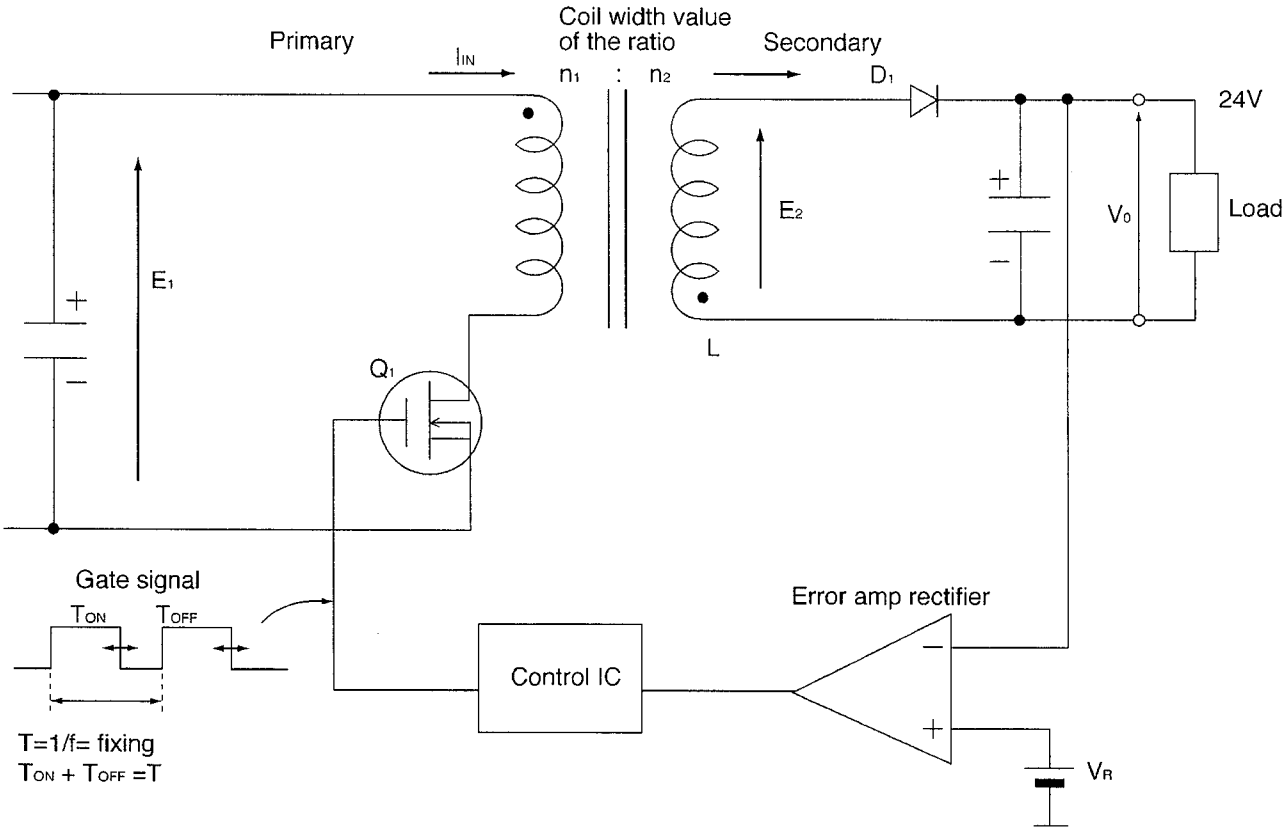
The input current goes into the input rectifier circuit through the filter circuit. The filter circuit decreases the noise voltage and the noise electric field strength.

[Rectifier Circuit]

The input current is rectified by D101,D102,D103 and D104 and charges C106 to make DC voltage. Then it supplies power to the converter circuit.

[Kick-on voltage circuit]

Bias is applied to the Q101 gate via this circuit when the AC power is turned on and Q101 begins operating.



The following is an overview of how the power supply unit is controlled.

The control method of this power supply unit is pulse width modulation.

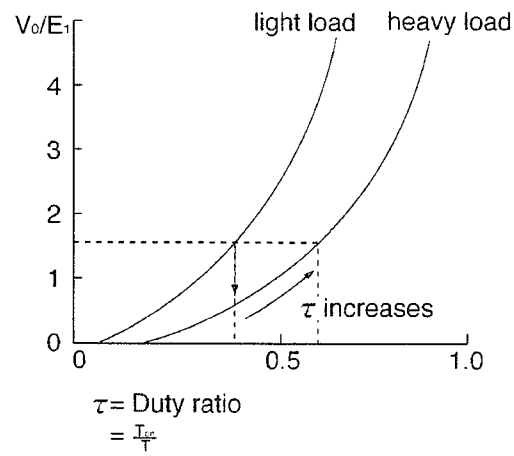
When Q_1 is ON, the energy is charged in the transfer primary coil according to E_1. When Q_1 is OFF, the energy is output from the secondary transfer as follows.

L → D_1 → Load → L

Then the power is supplied to the Load. When Q_1 is ON, power is not output from the secondary side. The output voltage is fed back in the control IC according to the error amp rectifier. Then depending on how T_{ON} is controlled, stabilization occurs. Also, when the current load becomes too large, in order to decrease the voltage output, the increase in τ is controlled and the output voltage is stabilized.

Therefore, basically the timing: Ton/Toff of Q1 controls the output voltage.

Output/Input voltage value of ratio



KX-FP121

[Surge Absorber Circuit]

This circuit is for absorbing surge voltage generated by the transformer.

[Control Circuit and Detecting Circuit]

The control circuit amplifies the output with increased voltage detected in the error detecting circuit. Then it drives the main transistor.

In this power supply, the duty ratio is defined by changing the ON period of the main transistor.

This is shown as follows.

When the output voltage of the 24V circuit increases, the current of the photo coupler PC101 increases, the pulse width of the output control IC becomes narrower and the ON period of Q101 becomes shorter.

[Over Current Limiter (O.C.L)]

The highest drain current (Q101) is limited by a limiter circuit (IC101) of 24V. The 24V output is limited by this circuit.

[Over Voltage Circuit]

If the 24V output increases because the error detecting circuit or control circuit is broken, IC101 will recognize this signal and output becomes 0V.

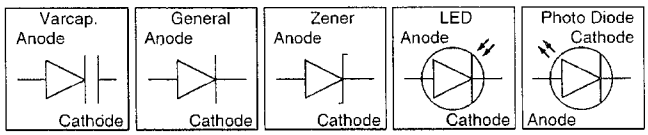
Dummy load method (to quickly check the power supply output)

Refer to **2.3.3.6. Power Supply Board Section**.

7 FOR THE SCHEMATIC DIAGRAMS

Note:

1. DC voltage measurements are taken with an oscilloscope or a tester with a ground.
2. The schematic diagrams and circuit board may be modified at any time with the development of new technology.
3.



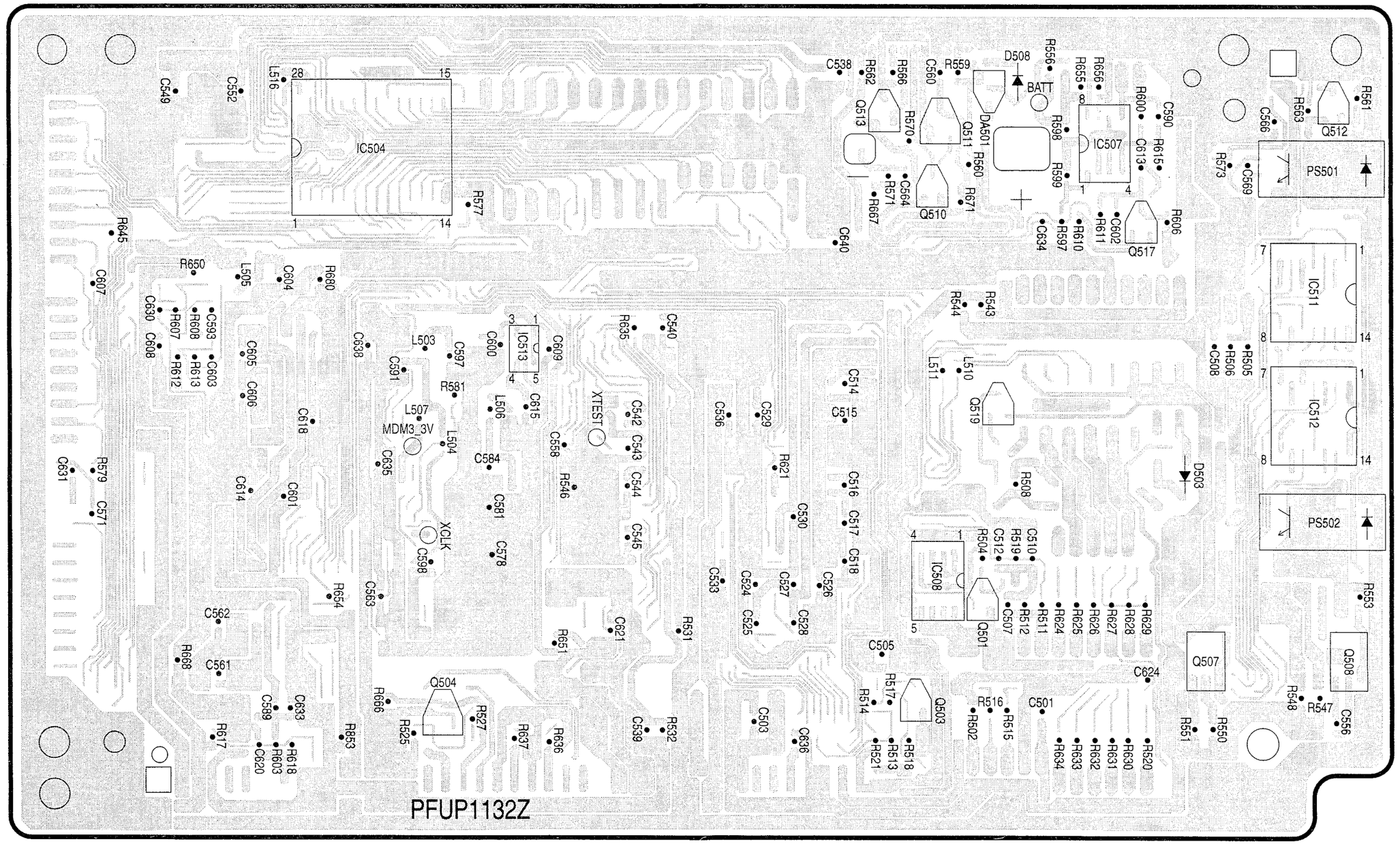
Important safety notice
Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only the manufacturer's specified parts.

7.1. MEMO

8 PRINTED CIRCUIT BOARD (DIGITAL BOARD)

8.1. PRINTED CIRCUIT BOARD

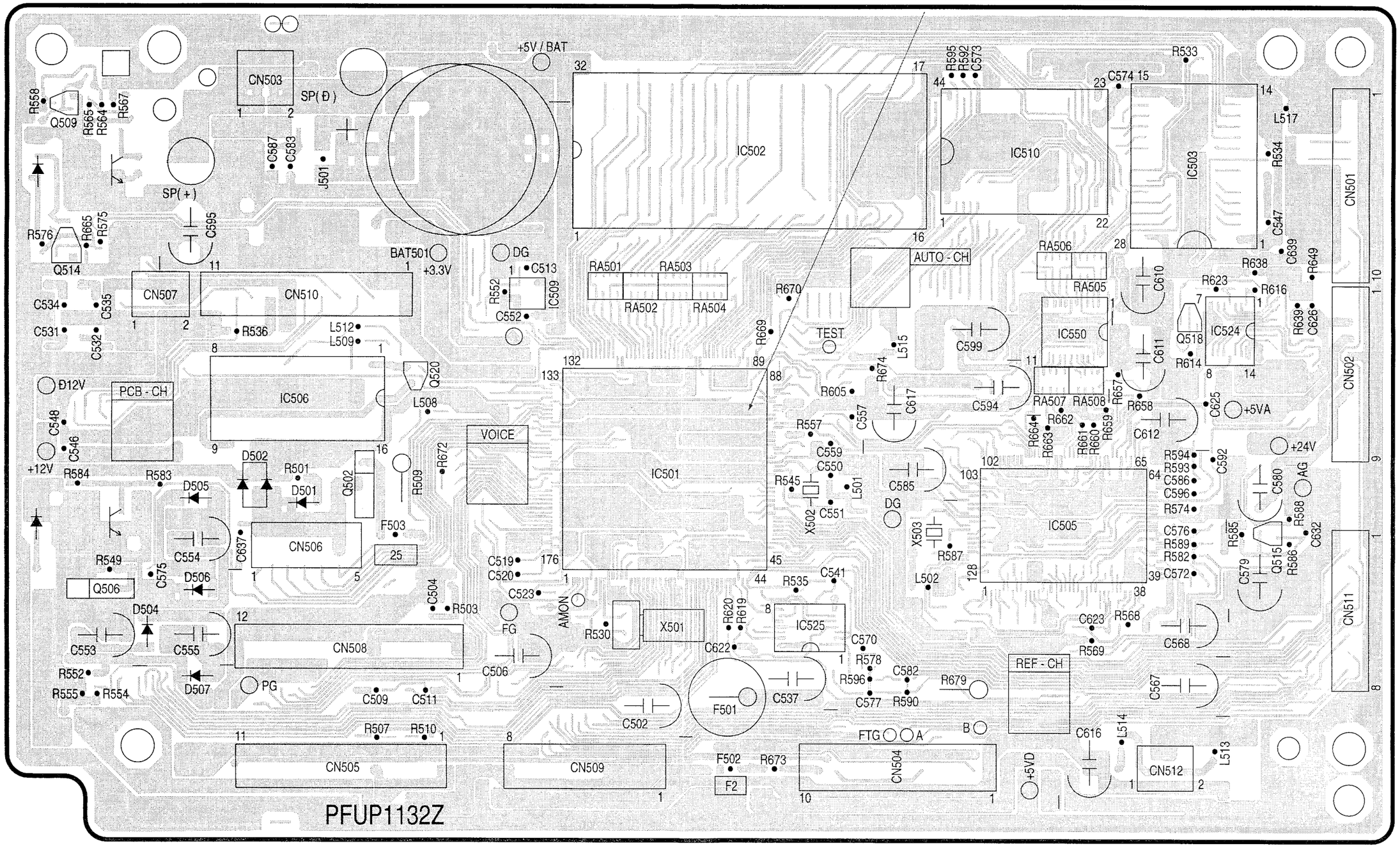
(Bottom View)



8.2. PRINTED CIRCUIT DIAGRAM (DIGITAL BOARD)

Pin No.	Waveform	Pin No.	Waveform
8, 9	32kHz	66, 67	24MHz

(Component View)



9 SCHEMATIC DIAGRAM

9.1. SCHEMATIC DIAGRAM (DIGITAL CIRCUIT)